

PALM, PAUL WERNER, D.M.A. Baroque Solo and Homogeneous Ensemble Trombone Repertoire: A Lecture-Recital Supporting and Demonstrating Performance at a Pitch Standard Derived from Primary Sources and Extant Instruments. (2010)
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The dissertation project included four recitals containing representative works for solo trombone with piano and one lecture-recital. The purpose of the lecture-recital was to present works composed before 1750 for solo trombone and homogeneous trombone ensemble. The performance editions were developed from the most authoritative available sources of works written by composers for the pitch standard of their time and geographical location. The performance editions were recreated in current nominal pitch from facsimiles of original editions or manuscripts. Information from contemporary primary theoretical music treatises and the study of extant Baroque instruments is reflected in the performance editions. The performance of one solo work and seven ensemble works was preceded by a lecture that detailed the evidence from which the premise and approach to the performance editions developed according to the selected pitch standard.

All identified Baroque trombone compositions for solo and homogeneous ensemble were written in tonal centers that result in minimal use of the first position of current instruments. Repertoire from the seventeenth century for other instruments is idiomatic to their sounding length. The study addresses the comparatively uncharacteristic writing for the trombone.

Publishers, sheet music distributors, library holdings, audio recordings, and subject matter experts were consulted to identify extant compositions that met the criteria. The

earliest source for each work was compared to available twentieth-century editions. None were determined to contain key differences between the original and subsequent editions.

Facsimiles and English translations of theoretical music treatises that addressed the characteristics of trombones during the Baroque period revealed that the instruments were nominally pitched one semitone below the current (*i.e.* post-1939) standard. Also, the sounding pitch of extant Baroque trombones, cornetts [*Zinken*], and organs was examined in multiple documents. A consensus revealed the fact that the sounding pitch of twenty-first-century trombones is at the same level of their Baroque counterparts. The determination, therefore, was that only the nominal pitch has changed. The performance editions for solo trombone and homogeneous trombone ensemble were edited into current standard notation and reflect the original Baroque sounding pitch standard. Scholarly editions of all works that met the criteria of the study were prepared for publication.

BAROQUE SOLO AND HOMOGENEOUS ENSEMBLE TROMBONE REPERTOIRE:
A LECTURE-RECITAL SUPPORTING AND DEMONSTRATING
PERFORMANCE AT A PITCH STANDARD DERIVED FROM
PRIMARY SOURCES AND EXTANT INSTRUMENTS

by

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Approved by

Randy B. Kohlenberg
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In memory of Elsa Mathilda [*née* Spannuth] Palm (1892-1993) whose parental removal
from the Sixth Grade left her with a lifelong appreciation of education.

APPROVAL PAGE

This dissertation has been approved by the following committee of the Faculty of
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Said schooling began earlier than, and has gone longer than, the norm thanks to the author's exceptional parents, Dr. John W. and Elizabeth A. Palm. Their support and encouragement has been unwavering. Words cannot convey sufficient gratitude.

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DEFINITION OF TERMS

The nomenclature used in this writing is Scientific Pitch Notation. The following figure represents the range of a current 88-key piano on which middle *C* (~ 262Hz) is C_4 .

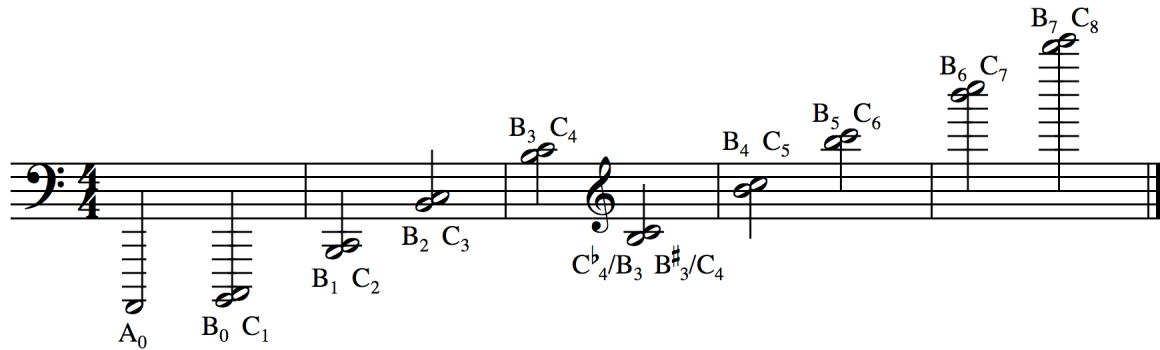


Figure 1. Scientific Pitch Notation covering the range of a current 88-key piano.

The frequency of pitches will be based on the current Western standard of $A_4=440\text{Hz}$ and equal temperament. When historical pitches are discussed, semitones will be added where necessary to indicate alternate frequencies (*e.g.* A^{+1} sounds as *B-flat*, one semitone above a current *A*).

Historic pitch	Current pitch	Hertz
A_4^{+2}	B_4	~ 494
A_4^{+1}	$B\text{-flat}_4$	~ 466
A_4^{+0}	A_4	440
A_4^{-1}	$A\text{-flat}_4$	~ 415
A_4^{-2}	G_4	~ 392
A_3^{+0}	A_3	220

The overtone series will be referred to in partials, with the fundamental being P_1 , the first overtone P_2 , and so on. For a current B-flat tenor trombone, this results in first position containing a P_1 of $B\text{-flat}_1$, a P_2 of $B\text{-flat}_2$, a P_3 of F_3 , a P_4 of $B\text{-flat}_3$, *et cetera*.

CHAPTER I

ELEMENTS OF AN HISTORICALLY INFORMED PERFORMANCE

Introduction

The performance of early repertoire increasingly incorporates an awareness of extended considerations. Although the compass of “early” is debated, its inclusion of music from the Baroque period (1580-1750) is widespread. Less well versed performers may be aware of issues such as the use of period instruments, combinations and doublings of forces, and *urtext* editions. The matter of sounding pitch, however, is less well known.

The International Standardizing Organization meeting in London of May 1939 set standard pitch at $A_4=440\text{Hz}$. Prior to that, identified pitch standards in Europe varied nearly six semitones, although those variations have been smaller since *circa* 1830.¹

While pitch is relative, the production of pitch is not uniform on most instruments. For example, the A minor scale and the A-flat minor scale on a current keyboard, while being just one semitone apart, have differing idiomatic fingerings. The key of a composition similarly affects other Western instruments. Also, standard pitch, transposition, and tuning system combine to ultimately determine sounding pitch from a nominal pitch.

Performed on the current B-flat ($A_4=440\text{Hz}$) tenor trombone with no valves or F-attachment, the following musical example demonstrates the inequality of positions.

¹ Bruce Haynes and Peter Cooke, s.v. “Pitch,” in *Grove Music Online. Oxford Music Online*, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/40883> (accessed Feb. 04, 2010): I, 1.



Figure 2. Slide position shifts demonstration for a current B-flat ($A_4=440\text{Hz}$) tenor trombone.

The first measure of Figure 2 does not contain a note found in today's first position, for which the slide is fully retracted. Although each note of the measure is a single position shift apart and the technical difficulty is minimal, it still possesses a slightly different performance characteristic than the second measure. Half of the notes in the second measure are obtained in today's first position, the position which possesses the most physiologically and psychologically secure quality of all seven for the trombonist. The third measure requires successive shifts from seventh to first position, thereby including the largest slide extension on a B-flat tenor trombone and the largest required slide shift between successive notes. Although the shifts are close to the same distance as required in measure 2, the greater arm extension for measure 4 alters its characteristic.

As tempo increases, the third measure becomes technically impossible sooner than the other three measures. This illustrates that no two positions on the trombone are equal and that particular slide shifts are an integral part of trombone performance without need for further elaboration.

Current consensus holds that composers during the Baroque period were well aware of the particular performance characteristics of the instruments for which they expressly wrote. Guided by the intent of creating compositions for specific forces, it therefore follows that Baroque composers accordingly selected range, technical demands, and, in turn, the key(s) for a work. Due to the previously demonstrated nature of the

trombone slide, choice of keys for this instrument was of particular importance.

Specification of instrumentation was not the Baroque norm. Indeed, a large percentage of published music was designated as *per sonare con ogni sorte di stromenti*.² Much of current historical performance practice is based on analysis of the performance requirements of specified instrumentation. Therefore, a publication containing an indication that the composition was intended for trombone(s) is sufficient grounds to accept that the work was accessible to, idiomatic for, and/or representative of that instrument. Hence, this study accordingly proceeded from the presumption that Baroque trombone music was particularly well suited for the instrument of that time.

Early trombone repertoire has not received the level of scholarship enjoyed by many other Western instruments. Where performance editions exist, the editing is rarely critical and a distinction is often not made between the composer's work and the editor's additions. Some works exist only in their original printing or manuscript.

Of all the Baroque solo and homogeneous ensemble (S&HE) repertoire expressly indicated for trombone(s) identified in this study (see Appendix A), only five works are not based on either the tonal center *A*, *D*, or *E*. This is counterintuitive to a trombonist as those tonal centers do not maximize the performer's use of first position. Although not as extreme as in the case of measure 3 in Figure 2, a work based on *A* for a B-flat tenor, on *D* for an E-flat alto, or *E* for an F bass parallels the nature of measure 1 instead of the more natural measure 2. This disparity between current idiomatic and Baroque chosen tonal centers was selected for exploration.

² 'for sounding with [on] any sort of instruments' (*i.e.* for non-specified instrumentation)

Purpose

The purpose of this study was to present a public performance of works composed before 1750 for solo trombone and homogeneous trombone ensemble. An historically informed performance includes the best available source of the composition and the knowledge of the composer's pitch standard. This study identified both of these components from recent editions, manuscript and original edition facsimiles, primary theoretical music treatises, and extant instruments. The recital was preceded by a lecture that presented the evidence for the selected pitch standard and performance editions.

Limitations

Evaluation of recent editions of the identified compositions beyond such basic elements as key, clefs, and instrumentation was beyond the scope of this study. Baroque compositions with *obbligato* trombone parts, except those scored for any combination of *Zinken* [cornetts] and trombones, were not addressed. Those works contain an additional consideration—the sounding pitch of the non-trombone and non-*Zink* instrument(s)—that was not integral to the conclusions of the study. Also, the survey of repertoire for cornett and trombone combinations did not extend beyond the determination of the relationship of the notated pitch between the two instruments.

Although a complete harmonic analysis of each work was necessary to identify errata in the primary sources, this study did not examine or discuss forms, functions, formal organization, or other theoretical aspects. Biographies of the composers were not researched beyond readily available information and only of sufficient scope to include within the preface of new scholarly editions. These pending publications will contain

prescriptive performing additions such as tempos, dynamics, and figured bass realizations. Pre-press working copies were used for the rehearsals and during the recital component. The bibliography, in addition to the citations, is intended to refer readers to sources that address considerations relevant to historically informed Baroque performance. That said, the study neither reviewed, corrected, nor attempted to further the body of current knowledge pertaining to Baroque trombone performance practice.

Procedure

The resultant performance of this study necessitated making the identified works accessible to collegiate trombonists of today while integrating historically informed performance practice. Research was first done to identify all extant Baroque S&HE trombone compositions via printed and electronic catalogs, audio recordings, and correspondence with subject matter experts. The most authoritative source available for each work was then identified, acquired, and assessed. Additionally, an exhaustive search for subsequent editions of each composition was made, with an attempt to acquire each, and a general appraisal of them in relation to their original source.

Each composition was then read to determine whether any available edition provided the trombonists of today with an adequate performance source. This evaluation was primarily based upon parameters set by a working knowledge of historically informed performance practice and a review of related literature.

Where no satisfactory performance edition existed, such was created for those compositions selected for the recital component of this project. A solo work and several ensemble works were rehearsed to ensure stylistically appropriate interpretations. Their

public performance was preceded by a lecture that presented evidence to support the conclusions of the study.

Related Research

Components integral or germane to this study (*e.g.* primary source theoretical music treatises, extant Baroque instruments, Classical period trombone repertoire) that have already received scholarly attention were drawn upon. Original instruments have been measured, their provenance verified, and their principle sounding frequency ascertained. Music treatises have been translated into English, critically evaluated for errors, and placed in historical context. The Classical period trombone repertoire has been analyzed for technical demands, role evolution, and tonal center migration. Nevertheless, each of these subjects has been addressed, considered, and disseminated in discrete and sometimes obscure venues. Taken together, this document intends to produce a synergy of information not previously available for historically informed trombone performance practice of Baroque repertoire.

CHAPTER II

THEORETICAL MUSIC TREATISES

Nominal pitch is only a reference to an established standard pitch. Determination of which notes were sounded by, and where they were sounded on, an instrument is an integral step to determining historical sounding pitch. Many historical European musical instruments still in use today have detailed Baroque treatises on performance practice. The trade secret nature of performance in the *Stadtppfeifer* guilds is presumably the reason that the trombone lacks such a resource.³ Despite that, the trombone is not absent from theoretical music treatises of the period.

Zacconi

Lodovico Zacconi (1555-1627) addressed the trombone at least three times in his primarily vocal treatise *Prattica di musica* (Venice, 1592). First he observed its unique characteristic of having a natural diatonic, then the instrument's capability of adjustable intonation.⁴ Zacconi later addressed the compass of the trombone (Figure 3) as follows:

The trombones go up to A₄ and lack little of what we want in descending, because with sliding [*slungar*] the pipe [*canne*], and including the wrongs,⁵ we get most of the ordinary pitches.

³ Pattee Edward Evenson, *A History of Brass Instruments, Their Usage, Music, and Performance Practices in Ensembles During the Baroque Era* (DMA thesis, University of Southern California, 1960), 84-112. Arnold Fromme, "Performance Technique on Brass Instruments During the Seventeenth Century," *Journal of Research in Music Education* 20, no. 3 (Autumn 1972): 329.

⁴ Lodovico Zacconi, *Prattica di musica* (Bologna: Forni, 1967), facsimile, *Libro quarto*, XLVII/¶4.

⁵ "including the wrongs" likely meaning either chromatic notes or frequencies between pitches.

I Tromboni poi vanno alti fino in A la mire alto: & descendano poco manco quanto si vuole; perche col slungar le canne, & agiungerui i torti si cauano voci di pin del ordinario.

Figure 3. Trombone compass from Zacconi's *Prattica di musica* (Libro quarto, LVI/¶3).

Cerone

The 1,161-page Spanish music treatise *El melopeo y maestro* (Naples, 1613) by Pedro [It: Pietro] Cerone (1566-1625) is not yet available in an English translation. Two brief discussions of the trombone were located within its text during this study. Cerone's primary sentence on the sackbut (Figure 4a) reads as a nearly direct Spanish translation of Zacconi's Italian offering. Therefore, Zacconi was likely Cerone's source, or both writers borrowed their trombone entries from the same unidentified third source.

Los Sacabuches van tan alto, que llegan hasta a A la mire sobreagudo; y abaxan poco menos quanto quisiere el Tañedor, porque con alargar los cañones y añadirles los tuertos, le hacen voces de mas del ordinario. Estas pues son las subidas y baxadas de los instrumentos estables; particularmente de los, que tañen vna sola parte.

*Sacabuchos ca
fi a 20 ptes,
desde A la mi
re sobreagudo
hasta a los re
propolares.*

Figure 4a. Trombone entry from Cerone's *El melopeo y maestro* (Libro XXI, 1063/¶10).

El melopeo y maestro also contains an original range chart of wind instruments.⁶ The *Sacabuche*⁷ is the only instrument lacking a lower range limit on the chart (Figure 4b) and is subtitled “17 y mas.” When considered with the other instrument ranges and their subtitles, the deduction is that Cerone considered the range of the sackbut to be F₂ to A₄

⁶ Pedro Cerone, *El melopeo y maestro* (Barcelona, [Spain]: Consejo Superior de Investigaciones Científicas, 2007), facsimile, 2:1296.

⁷ Spanish equivalent of De: *Posaune*, En: *sackbut*, Fr: *sacqueboute*, and It: *trombone*. For an historical overview of nomenclatures, see F[rancis] W. Galpin, “The Sackbut, Its Evolution and History,” *Proceedings of the Musical Association*, 33rd Sess. (1906-07): 1-10.

“and more.” Indication whether “more” extended below F_2 , above A_4 , or both is lacking.

Also, his *Corneta blanca* and *negra* [white and black cornetts] were both pitched in A .



Figure 4b. Wind instrument range chart from Cerone's *El melopeo y maestro* (Libro XXI, 1064).

Baroque Plagiarism

Borrowing from prior music treatises was normal practice in earlier periods.

Guion has examined many musical writings from the 1700s containing trombone entries and identified that, “Most, if not all, ... are based at least to some degree on earlier writings.”⁸ Giovanni Battista Martini (1706-1784) authored the first volume of *Storia della musica* in 1757. Its trombone description relies on several earlier writers, including Mersenne, and the footnotes quote three others, which include Virgiliano.⁹ The significance of Martini's reference to Virgiliano will be addressed below.

⁸ David M. Guion, *The Trombone: Its History and Music, 1697-1811*, Rev. ed. (New York, [New York]: Gordon and Breach, 1998), 12.

⁹ *Ibidem*, 59-60.

Virgiliano

Aurelio Virgiliano (fl. ca. 1600) penned the incomplete manuscript *Il dolcime* (ca. 1600), which mainly focuses on the ranges and fingerings of musical instruments. His included positions chart for a trombone (top of Figure 5) is the earliest known.¹⁰ Writers have concentrated on the inconsistencies of this chart, notably the *C* where a *C-sharp* is expected in the *A* overtone series and the odd relative placement of G_4 and A_4 . The *C* may be attributed to an *A* minor diatonic conception of the instrument, as Figure 5 entirely lacks accidentals. For ease of reference in this study, these four Baroque positions—apparently based on their contemporary diatonic tetrachord conception of modes—are labeled I-IV while the current chromatic positions are labeled *i-vii*.

Virgiliano placed G_4 directly above E_4 and A_4 further out on the slide than E_4 . This may be conjecturally attributed to the tuning system he used, the high pressure embouchure his trombonists used, or a combination of the two. The possibility that a *B-flat* overtone series was obtainable closer in on the slide than A_3 is not directly opposed by any information in Figure 5. Yet the placement on the chart of F_3 , D_4 , and F_4 further out on the slide than the *A* overtone series demonstrates a lack of other *B-flat* overtone series pitches in a shorter sounding length than *A*. Therefore, Virgiliano's slide position chart,¹¹ as well as Zacconi's and Cerone's descriptions, would thus far suggest a tenor trombone nominally in *A*. Also, *Il dolcime* contains a fingering chart for a *cornetto*,¹²

¹⁰ Trevor Herbert, *The Trombone* (New Haven, [Connecticut]: Yale University Press, 2006), 35.

¹¹ For a compilation of trombone slide position sources from the Baroque period, see Keith McGowan, "The World of the Early Sackbut Player: Flat or Round?" *Early Music* 22, no. 3 (Aug. 1994): 456.

¹² Aurelio Virgiliano, *Il dolcime* (Firenze, [Italy]: Edizioni Scelte, 1979), facsimile, [105].

the same instrument shown in consort with three trombones in the principal diagram of Figure 5. With all of its tones holes covered, the cornett's sounding length is A .

Although the manuscript has no known contemporary publication or copies, Martini's reference to *Il dolcimelo* reveals at least one instance of its influence on early writers. Therefore, care was taken to identify later sources that provide additional or differing information, as opposed to those that rely on borrowing from prior works.

Praetorius

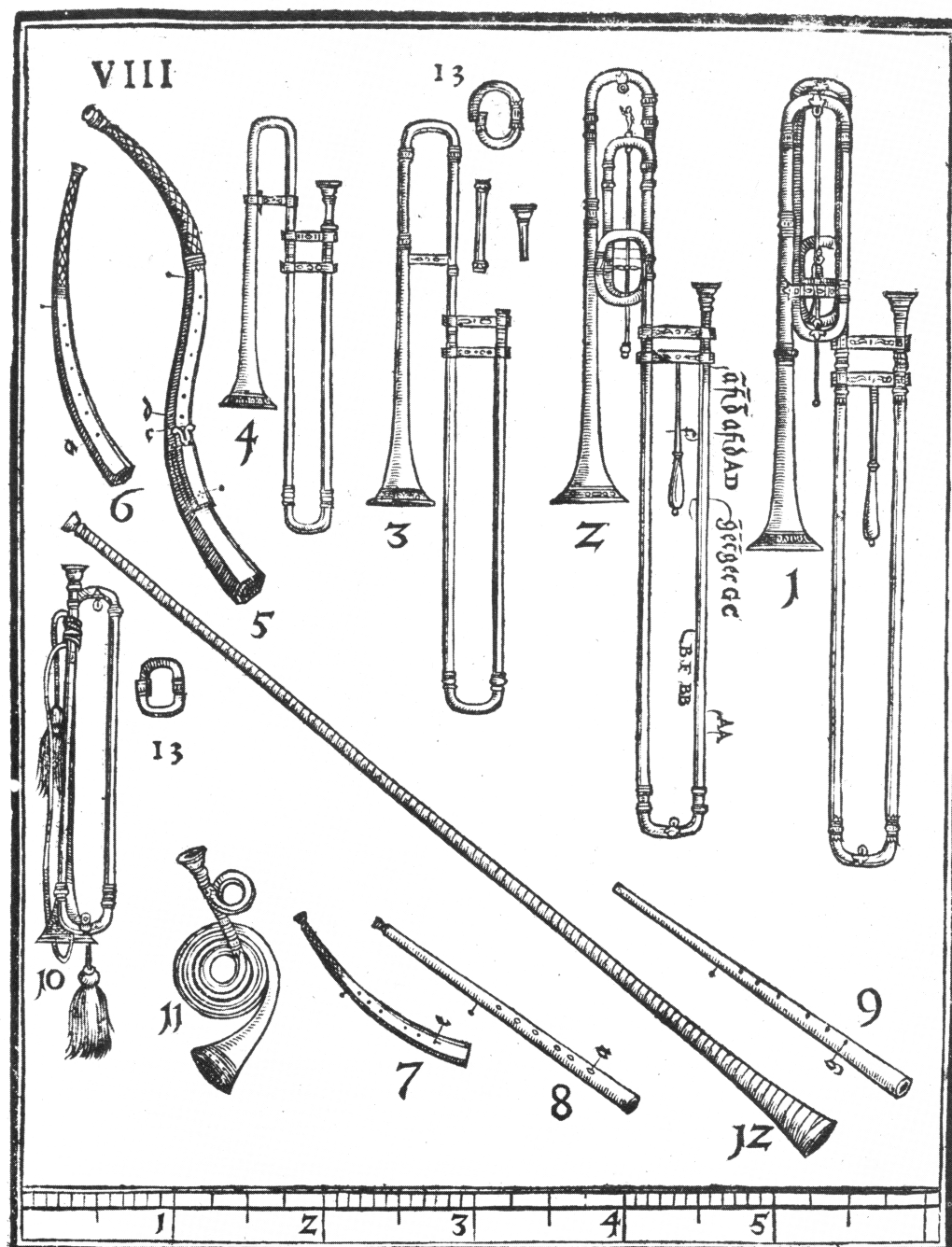
Michael Praetorius [Schultze] (1571-1621) repeatedly addressed trombones in *Syntagma musicum (Sm) II* (Wolfenbüttel, 1619). Three items from its text assist in evaluation of his trombone range chart and well-known woodcuts in *Sciagraphia* (Wolfenbüttel, 1620). First, bass trombones existed both a *Quart* [fourth] and a *Quint* [fifth] below the *gemeine oder rechte* [common or correct] trombone and an octave below the alto trombone.¹³ Second, one version of the *Octav* [contrabass] trombone exactly matched the slide positions of the common trombone and its natural compass began on E_1 .¹⁴ Third, within the discussion of *Pommern / bombard*s [shawms] he revealed that “most wind instruments ... have been made in consorts with the sizes pitched a 5th apart” and advocated a fourth apart for the interval between the lowest two members.¹⁵

Praetorius appended his *Theatrum Instrumentorum seu Sciagraphia* book of woodcuts to *Sm II*. Plate VIII (Figure 6a) contains lip-reed aerophones drawn to scale.

¹³ Michael Praetorius, *Syntagma musicum II – De Organographia: Parts I and II*, trans. David Z. Crookes (Oxford, [England]: Clarendon Press, 1986), 43. Michael Praetorius, *Syntagma musicum II* (Kassel, [Germany]: Bärenreiter, 2001), facsimile, 31/3.

¹⁴ Praetorius–Crookes, 43. Praetorius, *Sm II*, 32/4.

¹⁵ Praetorius–Crookes, 47-48. Praetorius, *Sm II*, 37/¶3.



1. 2. Quart-Posaunen. 3. Rechte gemeine Posaun. 4. Alt-Posaun. 5. Cornet / Groß Tenor-Cornet. 6. Recht Chor Zinck. 7. Klein Discant Zinck / so ein Quint höher. 8. Gerader Zinck mit ein Mundstück. 9. Stül Zinck. 10. Trommet. 11. Jäger Trommet. 12. Hölsern Trommet. 13. Krumbhüaël auff ein ganz Ebon.

Figure 6a. Aerophones from Praetorius's *Theatrum Instrumentorum seu Sciagraphia* (Plate VIII).

The “6. *Recht Chor Zinck*” and “7. *Klein Discant Zinck*” having sounding lengths a fifth apart, respectively in *A* and *E*, supports his wind consort construction statement. The trombone labeled “2” is shown with four main positions, the closest one in containing a wide *D* overtone series. Such continued Virgiliano’s apparent diatonic conception of positions. Accepting that this *Quart-Posaun* is the same length as was described earlier as a *Quint*, the following trombones are anticipated from the combined woodcuts¹⁶ and text: *Octav* in *A*; *Quint* in *D* or *Quart* in *E*; *Gemeine* (i.e. tenor) in *A*; and *Alt / Discant* in *E*.

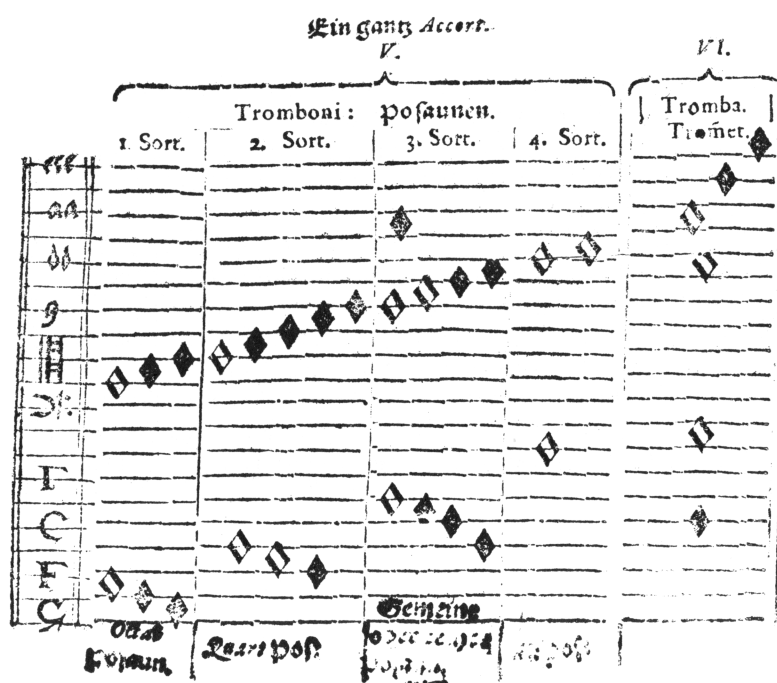


Figure 6b. Trombone consort compass table from Praetorius’s *Syntagma musicum II* (ch. IV, 20).

¹⁶ A justification for the 1. *Quart-Posaun* in Plate VIII being a *Quint* in *D*—shown in *C* with its whole-tone crook in place—which was convertible to a contrabass in *A*, via both its crook and extension of the rear bell bow slide, is found in Herbert W. Myers, “Praetorius’ Pitch,” in *Perspectives in Brass Scholarship: Proceedings of the International Historic Brass Symposium, Amherst, 1995* (Stuyvesant, NY: Pendragon Press, 1997), 33,36-39. Such would make the two basses, shown in *C* and *D*, the *Quint* in *D* and *Quart* in *E* described in *Sm II*. Myers’s four pertinent measurements—with and without crook, both with and without mouthpiece—in relation to his measurements of the *Alt-Posaun* in Plate VIII merit clearer communication.

Throughout the *Tabella Universalis* section of *Sm II*, Praetorius expressly used white notes to indicate the *natürlichen Thon* [natural pitch (*i.e.* range)] of instruments and black notes to indicate *Falset* (*i.e.* extended range).¹⁷ If his “natural” compass for each of the above anticipated trombones is taken to be from the lowest pitch–pedal tones being excluded—in position IV up to the P₇/P₈ of the nominal overtone series in position I, then his trombone table (Figure 6b) should indicate the following: *Octav* (E₁–G₃/A₃); *Quint* (A₁–C₄/D₄) or *Quart* (B₁–D₄/E₄); *Gemeine* (E₂–G₄/A₄); and *Alt / Discant* (B₂–D₅/E₅).

Praetorius indicated exactly the expected compass for an E alto trombone. The *Gemeine* compass also matches both the expected A tenor trombone range and the accompanying text regarding the exceptional *Falset* of [Erhard Boruss].¹⁸ The *Quart* trombone entry merits closer consideration. Accepting that *Quart* was a categorical term (*i.e.* bass) also applied to *Quint* trombones, two discrepancies still exist. The “*Quart Pos.*” figure, if for a D bass trombone, contains a white G₁ where a black G₁ is expected and a black D₄ where a white D₄ is expected. This may be conjecturally attributed to scribal or authorial error¹⁹ as *Sm* contains inaccuracies elsewhere.²⁰ The *Octav* trombone, other than missing a white P₇ of G₃, is consistent with Praetorius’s text.²¹ Also, the cornett table (Figure 6c) exactly matches the *Zincken* in Figure 6a, the *Recht Chor* [right (*i.e.* for with) choir] and *Gerader* [straight] sizes both having sounding lengths of *A*.

¹⁷ Praetorius, *Sm II*, 19/4-2.

¹⁸ Praetorius–Crookes, 43. Praetorius, *Sm II*, 31/2.

¹⁹ Alternately, this compass, along Praetorius’s seeming pattern, supports Myers’s *C* bass calculations.

²⁰ Herbert W. Myers, “Praetorius’s Pitch Standard,” *Galpin Society Journal* 51 (July 1998): 249. Myers, “Praetorius’ Pitch,” 29n6.

²¹ The considered absent G₃ would not be an omission if Praetorius’s *Octav* trombonists were always expected to achieve P₈ on this instrument.

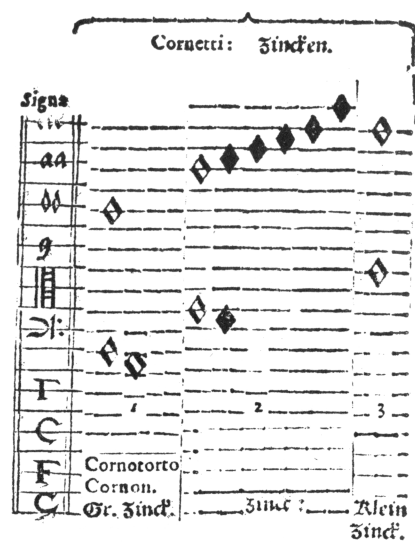


Figure 6c. *Cornetto* consort compass table from Praetorius's *Syntagma musicum II* (ch. IV, 22).

Syntagma musicum III (Wolfenbüttel, 1619) contains further evidence of an A tenor trombone. Praetorius referred to \bar{g} [G₄] and repeatedly to \bar{a} *lamire* [A₄] (Figure 6d) when warning of the upper limit of the *Tenor* trombone range.²² An upper limit of A-flat₄ (P₇) or B-flat₄ (P₈) would be more intuitive of the current B-flat tenor trombone. Yet a trombone nominally in *A* would have G₄ as its P₇ and A₄ as its P₈ first position [I/i] pitches. Within his early discussion of part assignments for *Concert* [ensembles], Praetorius listed a mixed consort with a *cornetto* in the role of *discant* over trombones.²³ Therefore, cornetts and trombones had an obligatory compatible tuning. The wealth of repertoire for mixed consorts of these two instruments both further demonstrates and necessitates such. Hence, this study also identified the cornett's nominal pitch.

²² Hans Lampl and S.E. Plank, "Praetorius on Performance: Excerpts from *Syntagma musicum III*," *Historic Brass Society Journal* 6 (1994): 256. Michael Praetorius, *Syntagma musicum III*, trans. Jeffery Kite-Powell (Oxford, [England]: Oxford University Press, 2004), 167.

²³ Praetorius–Kite-Powell, 158. Praetorius, *Sm III*, 154.

Diweiß aber alle vnd jede vff der gemeinen Tenor-Posaun das \bar{g} vnd \bar{a} lamire/im Alt, viel weniger vffm Chorist-Fagot, vii also in der 1. Stimme als dem Cantu, weñ er in Quarta oder Quinta inferiore, als ein Alt geblasen werden sol/nicht erreichen können/so muß man dieselbe Stimme/entweder mit einer Alt-Posaun/ oder Zingel Corthol, das ist ein kleinen Cant-Fagot musciren, oder aber Voce humana von ein Altisten singen lassen. Es muß aber in der Composition vor allen dingen dahin gesehen werden/ das in einer jeden Stimme die Noten vber die Octav nicht viel ascendiren. Denn obwol etliche Instrumentisten vff Chorist Fagotten, biß ins \bar{g} / vff Tenor-Posaunen biß ins \bar{a} / vnd noch höher bißweilen hinauff kommen können: So ist es doch in gemein allen nicht gegeben/sondern müssen in den Fagotten im \bar{f} / in den Posaunen im \bar{e} / vnd zum höchsten im \bar{a} / commoriren vnd verbleiben. So müssen auch die Barytoni, oder Vagant-Stimmen (das ist Quintus) deren Clavis Signata \bar{c} : vff der dritten/als der mittlern Linie stehet/nicht tieffer als biß ins c gesetzt seyn.

Figure 6d. Tenor trombone range warning from Praetorius's *Syntagma musicum III* (ch. VII, 164).

Mersenne

Marin Mersenne (1588-1648) revealed his limited understanding of the trombone in *Harmonie universelle* (Paris, 1636) by admitting the “apparent mystery of overlapping harmonic series yielding the same note with different [slide] shifts.”²⁴ Even so, the verbose explanation in his preceding natural trumpet entry²⁵ shows at least an empirical knowledge of the overtone series. His trombone description focuses on the physical characteristics of only one instrument size, which may be converted to a “fourth lower than its natural pitch”²⁶ via a rarely used *Tortil* [crook]. The use of *solfège* to describe its compass (Figure 7), while expanding Virgiliano’s four-position, diatonic natural minor conception to five positions of diatonic major,²⁷ offers no evidence as to the nominal

²⁴ Philip Bate, *The Trumpet and Trombone*, 2nd ed. (London, [England]: Ernest Benn, 1978), 144.

²⁵ Marin Mersenne, *Harmonie universelle: the Books on Instruments*, trans. Roger E. Chapman (The Hague, [Netherlands]: M. Nijhoff, 1957), 320-29.

²⁶ *Ibidem*, 342.

²⁷ The often repeated erroneous conclusions that Mersenne described a trombone with seven positions and in C must be attributed to a misunderstanding of his solmization, where *UT* is today’s moveable “Do.”

pitch of Mersenne's trombone. Likewise, his *Dessus* [on top (*i.e.* treble)] cornett, "used ... with the organ,"²⁸ is described in *solfège*²⁹ which offers no nominal pitch.

L'on fait donc aysément l'Octave, la Douzième & la Quinzième avec cet instrument sans user des branches; ce qui est aysé à entendre par les sons de la Trompette, qu'elle imite en cela. Mais on fait les huit sons de l'Octave en commençant par *sol*, que l'on entonne en mettant les deux mains l'une contre l'autre, à sçavoir la gauche sur la barre C D, & la droite sur E. Et pour dire *fa*, l'on baïsse les branches D E, & conséquemment la main droite de quatre doigts: ce que l'on fait semblablement pour sonner les autres degrez de l'Octave, dont le dernier ou le plus bas ton se fait en retirant les branches iusques à ce que les deux mains se touchent, comme elles faisoient au commencement de l'Octave, parce que les commencemens & les fins de toutes les Octaves se font sans l'ayde des branches par la seule variété du vent. Mais on doit remarquer qu'il ne faut pas quasi toucher le bocal, lors que l'on veut descendre fort bas, & qu'il faut le presser le plus fort que l'on peut contre les levres pour augmenter le vent, quand on veut monter aux tons les plus aigus: ce qu'il faut remarquer pour toutes sortes d'instrumens à bocal.

Or pour faire la seconde Octave en montant, & pour aller iusques à la Quinzième, il faut tenir la Sacquebutte toute iointe, ou fermée pour faire le premier ton, qui sera V T, & pour faire le R E, il faut baïsser les branches de la longueur du bras, ou environ; mais il les faut vn peu retirer pour faire le M I, & encore vn peu pour faire le F A. Mais pour faire le S O L, il faut retirer les branches comme au premier ton, & puis il faut les rallonger d'un demy bras pour faire le R E, & pour faire le M I, qui est le penultième ton de la Quinzième, il faut retirer les branches fort pres de la main gauche; & finalement pour acheuer la Quinzième, il faut fermer la Sacquebute, avec laquelle on descend, tout de mesme que l'on monte, par toute l'estendue de ladite Quinzième.

Figure 7. *Solfège* trombone positions in Mersenne's *Harmonie universelle* (*Liure Cinquiesme*, 272).

Anonymous

The rediscovery of a manuscript treatise entitled *Instrumentälischer Bettlermantl* [Instrumental Beggar's-cloak (*i.e.* Patchwork)] was announced at the Symposium on Musical Instrument History (Edinburgh, June 1994). Subsequent evaluation has attributed

²⁸ Mersenne–Chapman, 343.

²⁹ Marin Mersenne, *Harmonie universelle* (Paris, [France]: Quai Anatole-France, 1965), facsimile, 275.

its authorship only to the initials “A.S.” and placed its creation *circa* 1650. Within it:

The wind instruments are discussed more cursorily; nevertheless useful information on fingering patterns for curtals, recorders and cornetts is included. Many instruments are attractively illustrated in annotated watercolours. Slide positions for four sizes of trombone are indicated on ff.61-3, and tuning for both cornett and quint cornett is given alongside the drawing on f.52.³⁰

A facsimile edition with English translation is in preparation. Pre-publication access to the folios relevant to this study were offered by J. Patricia Campbell of the University of Edinburgh. The documents described have not been reviewed or received.

Speer

Daniel Speer (1636-1707) was a German *Stadtpfeiffer* [city musician], composer, and teacher in addition to music theorist. His “practical musical experience”³¹ lends weight to his treatise *Grundrichtiger ... Unterricht der musicalischen Kunst* (Ulm, 1687). A revised and substantially enlarged second edition was published ten years later. The 1697 entry on trombones differs only by minor spelling changes and three additions: two new illustrative trombone sonatas and a final sentence which prefaces them as such.

Speer stated that there are three main *Zuge* [pulls], “though a few more should be added.”³² The tenor trombone is shown to contain an *A* overtone series in its first *Zug* [I].

³⁰ J. Patricia Campbell, “Musical Instruments in the *Instrumentälischer Bettlermantl* - a Seventeenth-Century Musical Compendium,” *Galpin Society Journal* 48 (Mar. 1995): 160.

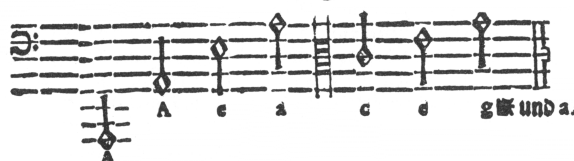
³¹ Rosemary Roberts and John Butt, s.v. “Speer, Daniel,” in *Grove Music Online*. *Oxford Music Online*, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/26380> (accessed Feb. 11, 2010).

³² Henry Eugene Howey, *A Comprehensive Performance Project in Trombone Literature with an Essay Consisting of a Translation of Daniel Speer’s “Vierfaches musikalisches Kleeblatt”* (Ulm, 1697), (DMA thesis, University of Iowa, 1971), 174.

The accompanying text (center of Figure 8a) places *C* and *F-sharp* a distance of *zwey quehr* [two transverse] fingers further out. The second *Zug* [II] contains a *G* overtone series with B-flat₃ *zwey quehr* fingers further out (bottom of Figure 8a). *Zug* four [IV], “almost out as far as one’s arm can be extended,”³³ contains *E*₂ and *H* [B₂]. *A nota bene* (bottom of Figure 8b) warns that B-flat₂ must be played somewhat further than *E* and *H*.

Erstlich ist zu wissen/ daß eine Posaun in zwey Theilen bestehet/ nemlich im Hauptstuck und in Stangen/ welche in einer Scheide stecken/ es wird aber das Hauptstuck auf die Stangen eingezapft/ und mit der linken Hand die ganze Posaun gehalten/ welche bräuchliche Haltung der Informator seinem Lehrling schon zeigen wird/ mit der rechten Hand aber ergreift man die Scheide zwischen die Finger; diese hat nun drey vornemliche Züge/ der erste Zug ist bey dem Mundstuck/ und bestehet in folgenden Buchstaben/ so das beygesetzte Exempel weist:

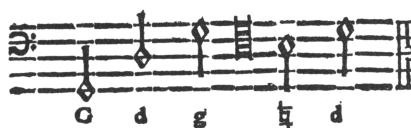
Erster Zug.



Dieser Buchstaben Thon werden alle im ersten Zug gefunden/ außer/ daß das c. um zwey quehr Finger etwas vorwärts muß gezogen werden/ bey welchem Zuge auf das f. ♯. sich befindet.

Der ander Zug ist bey dem Hauptstuck/ und befinden sich folgende Buchstaben darinnen/ wie zu ersehen.

Anderer Zug.



NB. Bey diesem Zug ist zu mercken/ daß das b. mol. um zwey quehr Finger hinaufwärts muß gezogen werden.

Figure 8a. Tenor trombone *Zug* 1-2 in Speer’s *Grundrichtiger ... Kleeblatt* (Dritte Klee-Blatt, 222).

Speer thus described seven positions, ranging from *E*₃ to B-flat₂, nominally one semitone lower than the current *P*₃ compass of a B-flat tenor trombone. Aside from possibly within the awaited position charts of the *Instrumentälischer Bettlermantl*, Speer’s 1687 *Grundrichtiger ... Kunst* provided the earliest identified source of both a

³³ *Ibidem*, 176.

chromatic conception of the trombone and the slide position for any *B-flat*. The entry continues with *Alt* [alto] and *Quint* [bass] trombones, both having the same three *Zug*, the first of which contains a *D* overtone series (Figure 8c). Also, the cornett fingering chart³⁴ in the 1697 *Grundrichtiger ... Kleeblatt* shows all tone holes covered producing an *A*.

Der dritte Zug ist vier quehr Finger außwärts des Hauptstucks/ und hat folgende Buchstaben/ wie zu ersehen :

Dritter Zug.



Der vierdte Zug auf einer Tenor-Posaun/ so man einen Bas darauf crackiret/ ist so weit drauffen/ als mans mit dem Arm fast erstrecken kan/ und seyn folgender Thon-Buchstaben/ wie zu ersehen :



NB, B, mol muß noch um etwas weiters als die fördern zwey Buchstaben E. und H. gezogen werden.

Figure 8b. Tenor trombone *Zug* 3-4 in Speer's *Grundrichtiger ... Kleeblatt* (*Dritte Klee-Blatt*, 223).

Von einer Alt - und Quint - Posaun.

Eine Alt - und Quint - Posaun haben auch drey/ und zwar einerley Züge/ wie auß bengezeichnetem Exempel erscheinet :

Alt - und Quint - Posaunen erster Zug.



Dieser erste in ersehender Buchstaben Zug/ ist bey dem Mundstuck.

Figure 8c. Alto/Bass trombone *Zug* 1 in Speer's *Grundrichtiger ... Kleeblatt* (*Dritte Klee-Blatt*, 224).

Speer's two illustrative trombone trio sonatas are the most recent repertoire that met the limitations of this study. Therefore, his 1697 treatise presents a logical limit for

³⁴ Daniel Speer, *Grundrichtiger Unterricht der musikalischen Kunst, oder Vierfaches musikalisches Kleeblatt* (Leipzig, [Germany]: Edition Peters, 1974), facsimile, 232[a].

Baroque trombone primary source evaluation. Also, Guion examined most primary and secondary sources from Speer through Joseph Fröhlich's *Vollständige theoretisch-practische Musikschule* (Bonn, 1811). In the latter, alto and tenor trombones are expressly and respectively in the current nominal E-flat and B-flat.³⁵ Such represents the first substantially differing description that Guion located after Speer. More recent findings by Weiner³⁶ and Carter³⁷ have further pushed back the earliest known direct indication of current nominal pitches for alto, tenor, and bass trombones respectively to André Braun's published method book (*ca.* 1795) and his manuscript (*ca.* 1785).

Nominal Pitch

The evidence identified in this study may be summarized as supporting the following pertinent nominally pitched Baroque instruments:

- cornett [De: *Zink*, Es: *Corneta*, Fr: *Cornet*, It: *Cornetto*]: *A*
- alto sackbuts [De: *Posaune*, Es: *Sacabuche*, Fr: *Saqueboute*, It: *Trombone*]: *D, E*
- tenor sackbut: *A*
- bass sackbuts: *D, E*
- contrabass sackbut: *A*

While nominal pitch is an integral component to determining sounding pitch, the former is not sufficient by itself for finding the latter. Therefore, this study proceeded to locate the next strand of necessary information.

³⁵ Guion, 92-117.

³⁶ Howard Weiner, "André Braun's *Gamme et Méthode pour les Trombones* Revisited," *Historic Brass Society Journal* 11 (1999): 93-106.

³⁷ Stewart Carter, "Trombone Pitch in the Eighteenth Century: An Overview," in *Posaunen und Trompeten: Geschichte–Akustik–Spieltechnik*, Michaelsteiner Konferenzberichte, 60, edited by Monika Lustig and Howard Weiner (Blankenburg, [Germany]: Stiftung Kloster Michaelstein, 2000), 60-61.

CHAPTER III

EXTANT MUSICAL INSTRUMENTS

Sounding pitch is derived from nominal pitch, a standard pitch, transposition, and tuning system. Having determined the nominal pitches for Baroque period trombones, the identification of a standard pitch was the next component. A₄ is both the standard pitch of today and of the period in question. Other writers have attempted to determine the pitch standards labeled in Praetorius³⁸ and Mersenne³⁹ via measurement and calculation. This study pursued a more empirical approach.

Trombones

Sounding pitch is repeatedly addressed in *Sm II*. Within his discussion of organ tuning for *Chormasse* [mixed choir], Praetorius offered the following guideline (Figure 9):

Also I hold for my humble self no better instrument, for establishing the correct pitch / than a trombone / especially [those] manufactured formerly and still / in Nürnberg; namely that [when] one takes off the slide by 2 fingers' width from the [fully closed] end / it gives in such a way right and just / in proper mixed choir [pitch] / the tenor A.⁴⁰

³⁸ Ephraim Segerman, "The Sizes and Pitches of Praetorius's Sackbuts," *Fellowship of Makers and Researchers of Historical Instruments Quarterly* 73 (Oct. 1993): 50-51. Myers, "Praetorius' Pitch," 33, 36-39. Ephraim Segerman, "Praetorius's and Surviving Nuremberg Sackbut Lengths & Playing Pitches," *Fellowship of Makers and Researchers of Historical Instruments Quarterly* 80 (July 1995): 34-36. Ephraim Segerman, "Praetorius's Cammerthon Pitch Standard," *Galpin Society Journal* 50 (Mar. 1997): 81-108.

³⁹ Ephraim Segerman, "Mersenne's Pitch Standard," *Fellowship of Makers and Researchers of Historical Instruments Quarterly* 80 (July 1995): 39-40.

⁴⁰ This writer's translation. For a freer English translation, see Arthur Mendel, "Pitch in the 16th and Early 17th Centuries—Part II," *The Musical Quarterly* 34, no. 2 (April 1948): 201.

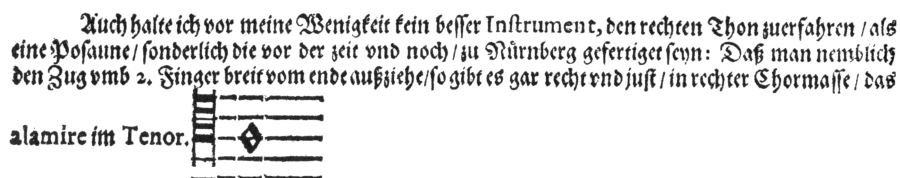


Figure 9. Praetorius's guide for A at mixed choir pitch from *Syntagma musicum II* (*Polyhymnium*, 232).

A consort of reproduction Baroque trombones was made available for this study. All three tenor models were built to match an extant original instrument that meets the above requirements for time and place of manufacture. Using a copy of an historical flat-rim mouthpiece, Praetorius's instructions were followed to produce an A₃ on each tenor. The pitch was measured with a digital tuner accurate to one cent [$\frac{1}{100}$ of a semitone]. With the slide the width of two fingers from being fully closed, all three tenors gave a *B-flat*—relative to current A₄=440Hz—that was 8-15 cents flat. Lack of experience on the instruments admittedly increased the inconsistency of pitch production. Still, these results were similar to experiments mentioned by Myers.⁴¹ The growing list of extant original Baroque trombones that have been likewise tested show comparable results.⁴²

Several variables potentially skewed the data of the above experiment. These include an internal relative pitch preference for 233Hz, the possibility that the extant Baroque specimen model has been altered from its original length, an embouchure which is possibly quite unlike the unknown contemporary Baroque trombone performance practice one, Praetorius's precise definition of "*Finger breit*," and the current width of fingers. Also, pitch is flexible enough on Baroque trombones that a player can alter the

⁴¹ Herbert W. Myers, "Praetorius's Pitch," *Early Music* 12, no. 3 (Aug. 1984): 370.

⁴² Herbert, 311-318.

frequency produced in any given slide length by nearly a semitone in either direction via mouthpiece pressure and embouchure. Therefore, additional demonstrable evidence of a standard pitch was needed.

Cornetts

A cursory review of Baroque repertoire revealed significantly more compositions expressly indicated for mixed *cornetto* and trombone consorts than pure trombone ones.⁴³ In addition to the primary source evidence previously examined and its resultant tuning implications, works pairing these two instruments exhibit their shared transposition. Therefore, the nominal *A* of an extant original Baroque cornett can be expected to match Praetorius's tenor trombone *A* pitch, except with the former an octave higher.

Haynes cataloged the sounding pitch of some 127 sixteenth- and seventeenth-century Italian and German cornetts in reasonably playable condition. He also identified “several checks on the plausibility and accuracy of pitch measurements in cornetts,” including consistency of performance and lack of original length alteration.⁴⁴ The pitch of black cornetts (Table 1a) ranges from 415Hz [A_4^{-1}] to 504Hz [$A_4^{+2} +34$ cents]. The array, however, has a 464-466Hz cluster of twenty-three specimens and a 460-471Hz core of forty-six specimens within the ninety-nine black (curved) cornetts population.⁴⁵ This data, while supporting the Baroque tenor trombone testing results of 231-232Hz [$A_3^{+1} -8-15$ cents], might also be skewed by some of the same previously mentioned variables.

⁴³ Michael Collver and Bruce Dickey, *A Catalog of Music for the Cornett* (Bloomington: Indiana University Press, 1996), *opere citato*.

⁴⁴ Bruce Haynes, *A History of Performing Pitch: The Story of “A”* (Lanham, Maryland: Scarecrow Press, 2002), 7.

⁴⁵ *Ibidem*, 60, 425-428.

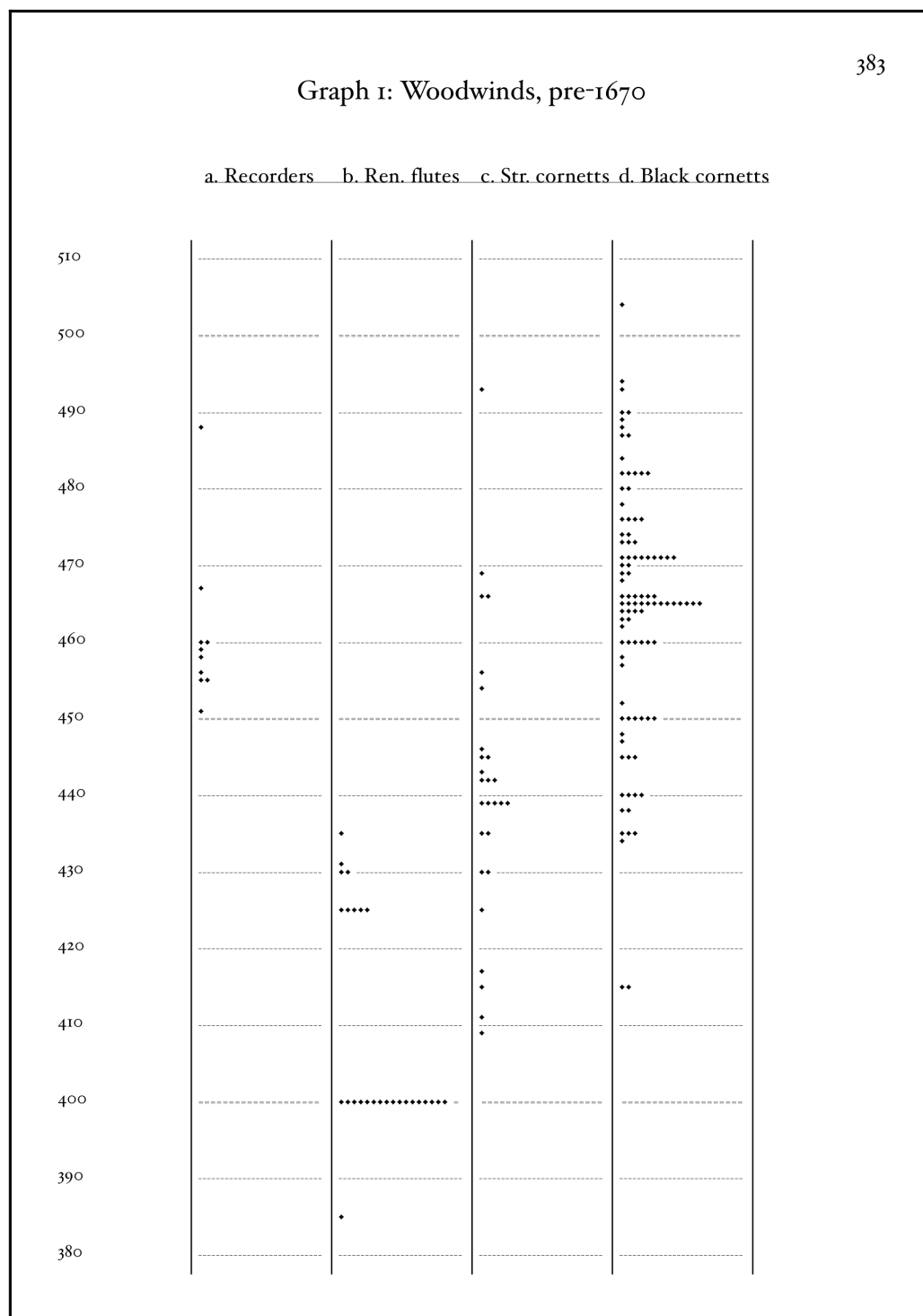


Table 1a. Pre-1670 woodwind pitches from Haynes's *A History of Performing Pitch* (Graphs, 383).
(Reproduced with permission from its author.)

Organs

Unlike trombones and cornetts, the sounding pitch of a keyboard instrument is not affected by a performer's technique or internal tuning preference. Also, some organs have the benefit of both written records as to their date of tuning and intended nominal pitch standard. The literature and repertoire is replete with evidence of using both cornetts and trombones with organs. Although Praetorius gave a Nürnberg trombone as his guide for establishing an *A*, the cornett was the more likely norm. This is evidenced by Baroque pitch standard terminology. Among the variety of labels used for standard pitches across Europe—many of which changed in definition by date and/or location—Haynes stated that *Cornettenthon* / *Cornet-ton* [cornett pitch] “can be regarded as a constant.”⁴⁶

Twelve organs still tuned to a pitch originally identified as some variant spelling of *Cornetton* survive. Their sounding *A* range is 450-467Hz with an average of 462Hz.⁴⁷ The number of surviving Baroque organs in Europe tuned prior to the standardization of $A_4=440\text{Hz}$, but without an associated pitch standard label, is much greater. The pitches of pre-1670 organs (Table 1b) range from 384Hz [A_4^{-2} -36 cents] to 503Hz [A_4^{+2} +31 cents]. But in Italy and Germany separately, 466Hz [A_4^{+1}] has the largest number of specimens. During this period, the foremost center of production for cornetts was Venice⁴⁸ and Nürnberg⁴⁹ for trombones; the same period and areas for most of the works examined

⁴⁶ *Ibidem*, 79.

⁴⁷ *Ibidem*, 44.

⁴⁸ Bruce Haynes, “Cornetts and Historical Pitch Standards,” *Historic Brass Society Journal* 6 (1994): 84-109.

⁴⁹ Robin Gregory, *The Trombone: The Instrument and its Music* (New York, [New York]: Praeger Publishers, 1973), 35.

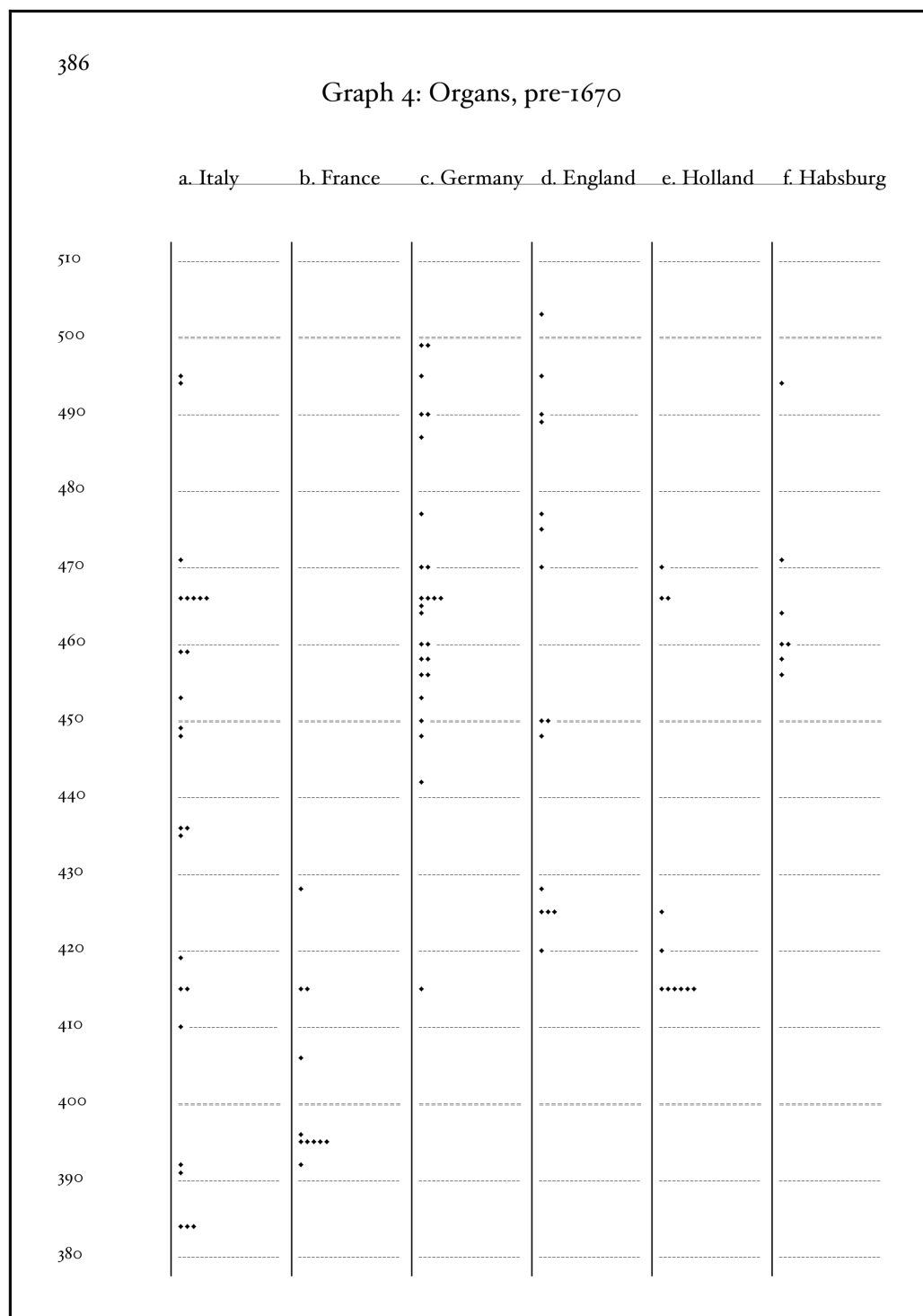


Table 1b. Pre-1670 organ pitches from Haynes's *A History of Performing Pitch* (Graphs, 386).
(Reproduced with permission from its author.)

in this study. Also, although their origins are more recent than most of the compositions in question, German organs dated 1670-1800 (Table 1c) predominate on or near 466Hz.

Mixed Consort

Evidence that composers using combinations of cornett, trombone, and organ considered all three instruments to be non-transposing is derived from two eminent sources. First, as previously mentioned, Praetorius repeatedly addressed sounding pitch. “Our normal modern pitch, to which nearly all of our organs are now tuned, is [at Prague] called ‘chamber-pitch’ [*CammerThon*].”⁵⁰ Also, “chamber-pitch is far and away the most commonly used—nearly all instruments, wind or stringed, and organs are built and tuned nowadays to chamber-pitch.”⁵¹ Later, in his brief discussion of the cornamuse, Praetorius stated that these instruments were “equal tuned with the choir-pitch, which is, a tone lower than our proper cornett- or chamber-pitch.”⁵² Therefore, Praetorius’s *Cammerthon* and *Cornettenthon* were the same, used by all three instruments in question, and thought of as the normal instrumental pitch standard.

Second, Johann Sebastian Bach (1685-1750) composed amidst and for “the convergence of traditional German and French [pitch] standards.”⁵³ A number of organs and cornetts from his time and locations survive and are pitched within A₄=464-466Hz.⁵⁴

⁵⁰ Praetorius–Crookes, 31. Praetorius, *Sm II*, 15/¶3.

⁵¹ Praetorius–Crookes, 35. Praetorius, *Sm II*, 19/4-4.

⁵² This writer’s translation. Praetorius, *Sm II*, 41/¶3.

⁵³ Haynes, 229.

⁵⁴ *Ibidem*, 230-232.

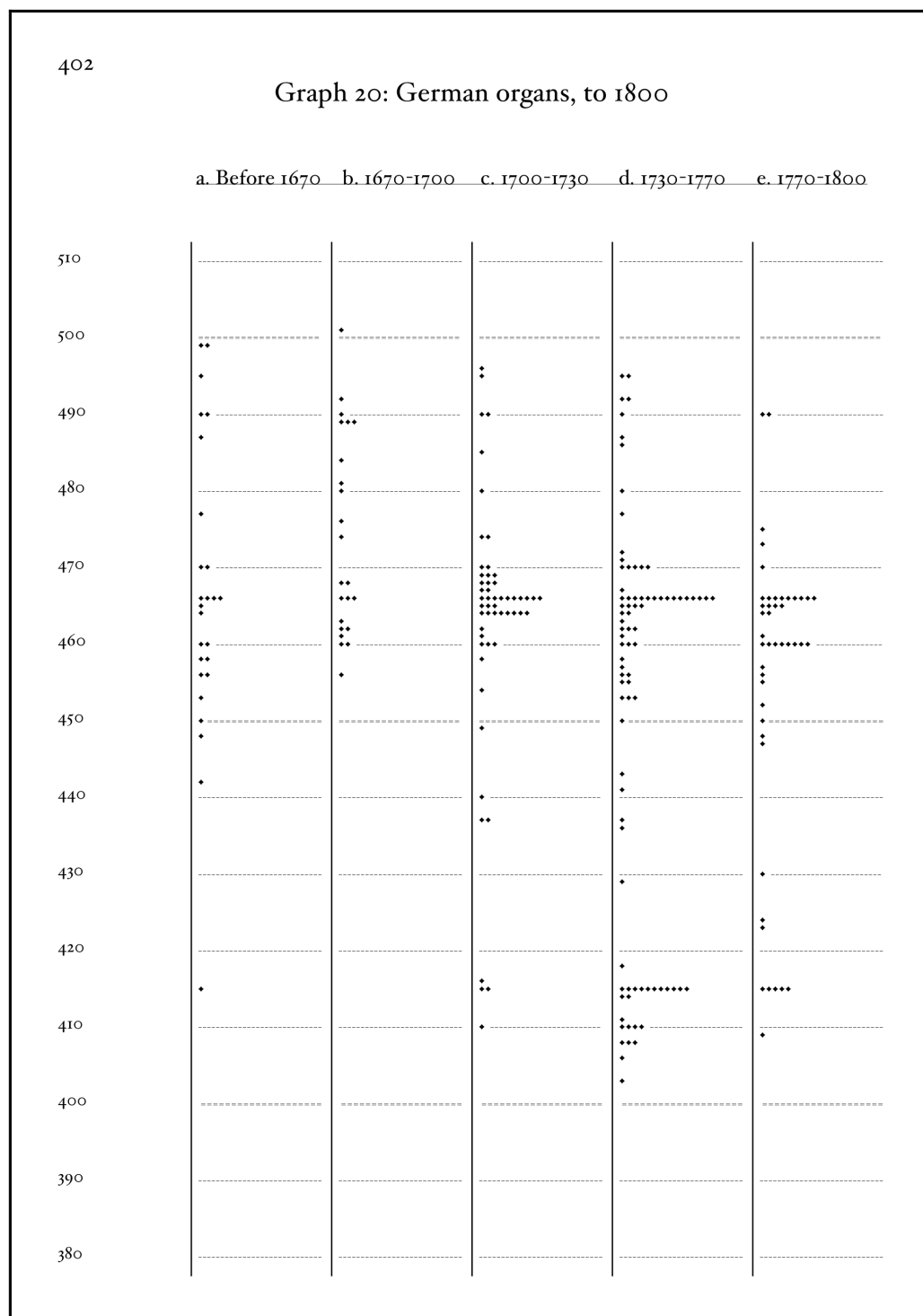


Table 1c. German organ pitches from Haynes's *A History of Performing Pitch* (Graphs, 402).
(Reproduced with permission from its author.)

Woodwinds, strings, and voices at Bach's disposal were tuned to differing pitch standards as is evidenced by manuscript parts notated in keys different from his organ part. Bach wrote fourteen church cantatas with *obbligato* trombone parts during 1723-1725 where his Leipzig *Nikolaikirche* organ was tuned to A⁺¹.⁵⁵ While the organ and trombones are notated in the same key, they are a whole tone lower than the other forces.⁵⁶ Therefore, although woodwind and string pitch standards changed between Praetorius's writing and Bach's composing, the shared tuning and lack of transposition for organ, cornett, and trombone spanned the Baroque period.

⁵⁵ Haynes, 215.

⁵⁶ Howard Weiner, "The Trombone: Changing Times, Changing Slide Positions (2)," *Brass Bulletin* 36 (1981): 60.

CHAPTER IV

CURRENT PERFORMANCE IMPLEMENTATION

Summary of Evidence

Compositions with specified forces, music treatises, and extant instruments are three primary sources of information for an historically informed performance of early repertoire. The solo and homogeneous ensemble trombone works from the Baroque period that have survived mainly originate from Italy and Germany. Contemporary music treatises nominally place tenor trombones in *A*, alto trombones in *D* or *E*, bass trombones in *E* or *D*, and contrabass trombones in *A*. Also, they were conceptually in diatonic minor with accidentals falling in-between the 3-4 main pulls [positions]. Relative to the current chromatic conception of trombones, these *Züge* corresponded to the first, third, fifth, and sixth positions of today. While a range of sounding pitches is documented, surviving Baroque German and Italian organs, cornetts, and trombones are most widely represented by the standard pitch $A_4=466\text{Hz}$. This sounding frequency is currently a *B-flat*. Ergo, only the nominal pitch conception of trombones has changed since the Baroque period while the absolute pitch has persisted.

Idiomatic Tonalities

As identified above, the Baroque diatonic conception of trombones equated to 3-4 principal positions. For a tenor trombone in *A*, the resultant idiomatic pitches appear in Figure 10a. An alto trombone in *D* and a bass trombone in *E* are shown in Figure 10b and

Figure 10c respectively. Each pitch is subscripted with its Baroque diatonic and current chromatic positions.⁵⁷ The given compass for each trombone is from P₂ in IV/*vi* to P₈ in I/*i* which represents the consensus of the music treatises evaluated in this study.⁵⁸



Figure 10a. Idiomatic pitches and slide positions for a diatonic Baroque tenor trombone in A.



Figure 10b. Idiomatic pitches and slide positions for a diatonic Baroque alto trombone in D.

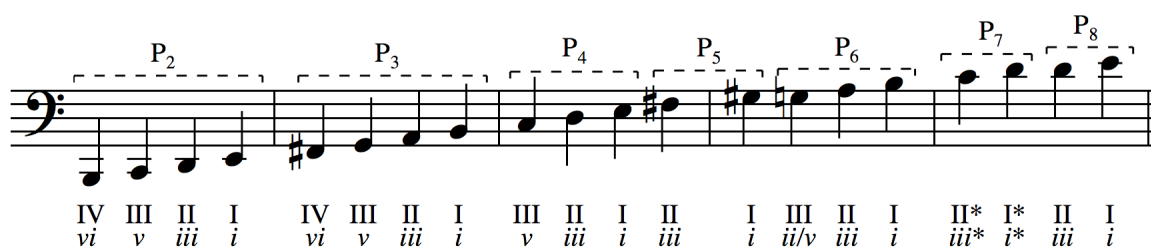


Figure 10c. Idiomatic pitches and slide positions for a diatonic Baroque bass trombone in E.

⁵⁷ Each P₇ pitch, which is 49 cents flat in equal temperament when taken in an unaltered position, is marked with an asterisk. The pitches requiring lesser alteration in equal temperament—these include all partials other than those a multiple of an octave above their P₁ (e.g. P₂, P₄, P₈)—are not indicated.

⁵⁸ A bass trombone in D has the same positions and pitches, except an octave lower, as those shown in Figure 10b. An alto trombone in E likewise matches the compass in Figure 10c, except an octave higher.

For the same reasons that a composer would select A minor over A-flat minor in a keyboard composition or the tonal center *A* over *B-flat* for a work featuring the cornett, Baroque S&HE trombone repertoire can be expected in keys that remain for the most part within their four described positions.⁵⁹ Moreover, a tonality that results in both the tonic and dominant pitches being sounded in position I would be the most natural choice. Common practice dictated that the uppermost voice contained the melody and, therefore, received priority in compositional considerations. Taking this and the idiomatic pitches shown above into account, suitable key centers were accordingly anticipated.

Of the twenty compositions identified in this study, all maximize the use of the above diatonic pitches. Their principal voices⁶⁰ and tonal centers are as follows:

- E alto trombone: *E* ×2, *A* ×3
- D alto trombone: *D* ×7, *G* ×3
- A tenor trombone: *A*, *D*, *F*⁶¹
- E bass trombone: *E*
- D bass trombone: *G*

Based on this compilation of information, the considered and deliberate choice of keys is self-evident. Composers who expressly specified a work for trombone(s) did so, not only knowing that the range was appropriate, but also that the pitches fit the primary positions.

⁵⁹ Baroque trombonists were not ignorant of and used the remaining pitches outside of these four positions as is attested by Praetorius's placement of *f* [F₃] on the 2. *Quart-Posaun* (Figure 6a) and Speer's discussion of notes with accidentals (Figure 8a). Up through Speer, however, four positions predominated.

⁶⁰ The principal voices listed here (e.g. E alto trombone) were determined by clef, range, tessitura, and tonality. The original sources only indicate trombone, not alto or tenor, for the works in this study. The occasional specification of bass trombone, although not with a sounding length, is the exception.

⁶¹ The anonymous *Cum esset desponsata* (MS, 1579) has four parts notated in baritone [F₃] clef and two parts in bass [F₄] clef. The combination of the unlikelihood of six bass trombones being available in consort, the range of each part, and the tonality choice of *F* all indicate performance on six tenor trombones.

Conclusions

Little of the evidence that appears in this study has not been evaluated by one or more prior writers. Although the bulk of interest in historical performance practice and the history of the trombone has been within the past fifty years, several of the sources addressed in this study have been known since their creation. As early as 1891, Mahillon drew from Praetorius and Mersenne to inform English readers of the original nominal pitches of trombones.⁶² In 1976, having already addressed the trombone in various other writings, Baines offered this opinion:

From the point of view of slide technique, all these A, E and D pitches mean that the old German music, including those excellent *Stadtpeifer* compositions of Pezel and Reiche, should, now that the trombone is in B flat, today be performed a semitone higher, which would also bring them closer to their original pitch in sound....⁶³

Readers are left to accept his research and conclusion as facsimiles of the primary sources Baines drew from are mostly absent from this portion of his trombone discussion. The past thirty years saw a steady growth in publications that addressed the nominal and/or sounding pitch of pre-nineteenth-century trombones with progressive inclusion of facsimiles. Although other writers have previously come to conclusions nearly identical to this study, a realistic implementation is still completely lacking.

⁶² Victor Mahillon, s.v. "Trombone," in *Encyclopædia Britannica*, 9th ed., vol. 23 (New York, [New York]: Charles Scribner's Sons, 1891), 586-587.

⁶³ Anthony Baines, *Brass Instruments: Their History and Development*, Rev. ed. (New York, [New York]: Dover Publications, 1993), 115.

Differing Schools

In essence, Baroque composers intended for trombonists to frequent first position. Carter equated this to the use of open strings on a violin.⁶⁴ Both the location of Baroque trombone diatonic positions and their original sounding pitches have become increasingly known amongst early music performers. Application of them is divided into two schools. The first is willful disregard, with trombonists performing the original notation at the current pitch standard ($A_4=440\text{Hz}$). This results in the dominance of second, fourth, sixth, and seventh positions (*i.e.* *ii*, *iv*, *vi*, and *vii*), having only position III/*vi* in common with original Baroque performance practice.

The second school is the original conceptualization of positions on either current manufacture or reproduction period trombones. For the trombonist who performs either chiefly or exclusively on a pre-Classical instrument and its associated repertoire, this is both viable and arguably ideal.⁶⁵ That said, these individuals comprise a very small percentage of the total population of trombonists.

The conceptualizing in *A* method, which can be considered to be and functions the same as transposing at sight, is endorsed by Weiner,⁶⁶ Quick,⁶⁷ Stradner,⁶⁸ McGowan,⁶⁹

⁶⁴ Carter, "Trombone Pitch...", 53.

⁶⁵ Players using this *Cornetton* ($A_4=466\text{Hz}$) approach will likely also incorporate an authentic floating position I in lieu of an anachronistic tuning slide. For suggestions, see McGowan, 455-457; Stewart Carter, "Sackbut," in *A Performer's Guide to Renaissance Music*, edited by Jeffery Kite-Powell, 2nd ed. (Bloomington: Indiana University Press, 2007), 131-133.

⁶⁶ Weiner, "The Trombone...", 60-61.

⁶⁷ Jeffrey Quick, "Which Pitch?" *ITA Journal* 14, no. 1 (Winter 1986): 10.

⁶⁸ Gerhard Stradner, "The Evolution of the Pitch of Cornetts and Trombones at the Time of Scheidt and Buxtehude," in *Dietrich Buxtehude and Samuel Scheidt: an Anniversary Tribute*, compiled by Isabelle Mills and Walter Kreyszig ([Saskatoon]: Univ. of Saskatchewan, 1988), 109.

and Woolf.⁷⁰ The realities of current professional musicianship hinder this approach. Carter concluded that “thinking of the instrument as keyed in *A* rather than *B-flat* is inconvenient, to say the least, for players who must switch back and forth from [Baroque] sackbut to modern trombone.”⁷¹ Stradner claimed that a trombonist “must learn to transcribe his fingering a semitone higher than he is accustomed to playing—a method that is a great burden for the professional musician.”⁷²

There is a third school, with historical precedence, that was somehow abandoned. Transposition is currently employed for uniformity of execution across an instrument group (*e.g.* flutes, clarinets, saxophones, trumpets). Yet transposing seems to have originated from conflicting pitch standards. From his evaluation of early 1700s German manuscript performance parts, Haynes concluded that “players were not apparently expected to transpose at sight” and “many separate parts copied out solely for the sake of their written key seems to indicate this.”⁷³ Said parts originated to aid performance in a time and place when several differing pitch standards were interacting. Furthermore, similar pragmatic solutions for performers pre-date the early 1700s.

Praetorius recommended the use of mental clef substitution for transposition,⁷⁴ removing the one apparent difficulty for a tenor trombonist performing on bass trombone.

⁶⁹ McGowan, 455-458.

⁷⁰ Adam Woolf, *Sackbut Solutions* (Mechelen, [Belgium]: Adam Woolf, 2009), 12-13.

⁷¹ Carter, “Sackbut,” 132-133.

⁷² Stradner, 109.

⁷³ Haynes, 184.

⁷⁴ Praetorius—Crookes, 43. Praetorius, *Sm II*, 31/3.

His advice alludes to contemporary trombone performance practices. The suggested substitution of tenor clef for bass clef will only succeed on a bass pitched a fifth lower than the player's tenor. This is possibly the pivotal reason *Quint* trombones were built. Transposition via clef would allow tenor and bass doubling without a player having to learn new slide positions,⁷⁵ a method not possible between tenor and *Quart* trombones.

Non-Transposing Trombones

The evidence would indicate that learning different positions for each trombone was an obstacle in the Baroque period. Prior to adoption of the valve in the early 1800s,⁷⁶ the bottom of a trombone's compass was limited by the nature of the overtone series. The construction of instruments in consorts of complementary sounding lengths gave a wider pre-valve range of available pitches. Any two instruments from the same group in a proportion other than a multiple of an octave require differing execution. The desire for musicians to double on like instruments thus gave rise to transpositions. For reasons outside of the scope of this study, trombones were bypassed during this transition to current transposing notation. The trombone family is overdue for a notational correction.

Practical Application

For the lecture-recital component of this project, members of the University of North Carolina at Greensboro 2009-2010 trombone studio were utilized for the ensemble

⁷⁵ Although conjectural, this may account for Praetorius's alto trombone in *E*, which would be playable using A tenor trombone slide positions via clef substitution. The transposition would require an E alto trombone part notated in mezzo-soprano [c2] clef which the player would mentally read as tenor [c4] clef.

⁷⁶ Philip Bate and Edward H. Tarr, s.v. "Valve (i)," in *Grove Music Online*. *Oxford Music Online*, <http://www.oxfordmusiconline.com/subscriber/article/grove/music/28961> (accessed May 02, 2010).

works. The trombonists ranged from first-year undergraduates to doctoral students. None had prior experience on either period instruments or any trombone other than those with a nominal *B-flat* in first position. Empirical evidence showed an appreciably greater willingness to perform on a different trombone when the learning of new slide positions was not a component. The trombones employed were two current E-flat altos [A^{+0}], one Baroque D alto [A^{+1}], eight current B-flat tenors with F-attachment [A^{+0}], three Baroque A tenors [A^{+1}], two current B-flat basses with F-/D-attachments [A^{+0}], two Baroque E basses [A^{+1}], and one Baroque D bass [A^{+1}]. All participants were provided with pre-publication typeset performance parts. Said sheet music was transposed as needed so that each trombonist read notation that corresponded to B-flat tenor trombone slide positions. For example, an originally notated D_4 for a Baroque alto trombone in *D* was newly notated as B-flat $_4$. This allowed for execution on a current E-flat alto trombone in first position at the original $\sim 311\text{Hz}$ *Cornetton* sounding pitch without a double mental re-positioning. Adoption of the unfamiliar instruments was thereby markedly accelerated.

The accompanying *violone* and organ *basso continuo* parts were likewise notated. Raising the nominal pitch one semitone from the original resulted in the addition of five flats to each key signature (*e.g.* A minor becomes B-flat minor). To alleviate the difficulty of keyboard accompaniment in anachronistic tonalities of 5-7 flats, the figured bass was realized in advance.

Subsequent Editions

An exhaustive search for other editions of the repertoire that met the limitations of this study revealed none notated in keys differing from the original sources. Further, an

expanded search for any publication addressing the use of trombones as transposing instruments identified few items. Anderson produced two method books for E-flat alto trombone containing parallel parts in both alto clef and E-flat transposing bass clef.⁷⁷ Kohlenberg included likewise parallel parts in his performance edition of the *Larghetto* extracted from a *Sinfonia* (Perger No. 34) by [Johann] Michael Haydn (1737-1806).⁷⁸ While other transposing trombone method books or performance editions may exist, they are unquestionably the exception to the norm.

The current effort necessary to enter performance parts into a music typesetting computer application is likely not appreciably more or less than for a fair manuscript copy drafted during the Baroque period. Beyond that, the dissimilarities are profound. Any individual with a laptop computer and a laser printer can now produce sheet music. The time and cost of moveable typesetting or plate engraving is absent, while the expense of paper is no longer a major consideration. Digital music editing also provides a hitherto unobtainable level of revisability. Furthermore, once a part has been entered into a computer application, its transposition into any key and notation in any clef can be done without the risk of introducing error and with essentially no additional effort. In short, the primary historical reasons for performers being bound to the normally one available published edition, as was the case during the Baroque period, no longer apply.

⁷⁷ Stephen C. Anderson, *A Complete Method for E-flat Alto Trombone*, vol. 1 ([Sioux City, Iowa]: Modern Editions, 1983), *opere citato*. Stephen C. Anderson, *A Complete Method for E-flat Alto Trombone*, vol. 2 ([Greensboro, North Carolina]: Modern Editions, 1986), *opere citato*.

⁷⁸ Johann Michael Haydn, *Larghetto*, edited by Randy Kohlenberg ([Greensboro, North Carolina]: Modern Editions, 1985), *opere citato*.

Outcomes

As previously shown, the S&HE trombone repertoire evaluated in this study is nominally notated one semitone too low for the slide conceptualization of most current players. Moreover, non-transposed repertoire for alto or bass trombone contains an obstacle of differing slide positions from the more prevalent tenor trombone. The recent advent of low-cost digital production allows for the addressing of multiple needs within one edition. Sheet music publications chiefly fall into the three general categories of facsimile, *urtext*, and performance. An edition containing a facsimile of the original source, an *urtext* with critical notes, and editorially prescriptive performance parts—both at $A_4=440\text{Hz}$ (*i.e.* one semitone higher than the original) and transposed as appropriate—will serve most needs while minimizing obstacles.

Performance Considerations

Although these notational changes create performance parts that are idiomatic to historical trombone performance practice, the *basso continuo* parts are a separate issue. Current keyboard instruments overwhelmingly exist at $A_4=440\text{Hz}$ and rarely have the ability to transpose the keyboard (*e.g.* make A_4 sound 466Hz). For any composition with a figured bass part that fits the conclusions of this study, accompaniment on an organ tuned relatively close to $A_4=466\text{Hz}$ is ideal. Failing that availability, an accompanist will have to perform anachronistic keyboard technique—the part being newly notated up one semitone—in order to produce Baroque historical sounding pitches. This study did not identify any other readily or widely available solution. When accompanied by a fixed pitch keyboard, the tuning temperament is dictated by said instrument. Also, options for

the standard pitch are limited to semitone intervals from the A₄ of the keyboard. Hence, as was the case during the Baroque period, tuning is also imposed by the fixed pitch instrument making deliberations such as A₄=460Hz versus A₄=465Hz rhetorical.

That said, historical accounts of *Turmmusik* [tower music]⁷⁹ and iconographical depictions of actual events⁸⁰ justify the performance of Baroque wind band repertoire *sans* included figured bass. For ensembles composed entirely of adjustable pitch instruments, just [pure] temperament is the natural tendency and ideal choice. While this study was limited to works expressly indicated for trombone(s), the original clef used to notate a part neither solely nor reliably dictated the size of the intended instrument. The synergy of evidence in this study would indicate selection of trombone sounding length based on the maximization of Baroque diatonic position usage, particularly first position.

Trombonists who have invested the time and effort necessary to conceptualized a tenor trombone in *A*, an alto trombone in *D* or *E-flat*, or a bass trombone in *D*, *E-flat*, *E*, or *F* may protest both the transcription of Baroque repertoire one semitone higher and/or the use of transposed parts. The reading skill necessary to perform on an alto or natural bass trombone from a non-transposed part is often considered a commodity by those who possess such. This study placed a higher value on the product than the process, choosing to provide players with performance editions that minimized the obstacles to performing Baroque trombone repertoire on a wide array of instruments.

To that end, the following analogy may be enlightening. Suppose that evidence

⁷⁹ Edmund A. Bowles, "Tower Musicians in the Middle Ages," *Brass Quarterly* V, no. 3 (Spring 1962): *opere citato*.

⁸⁰ Will Kimball, "Trombone History: 17th Century," Trombone History Timeline, <http://www.kimballtrombone.com/trombone-history-timeline/> (accessed May 10, 2010).

revealed a change in pronunciation of every English word between William Shakespeare's time and today. An historically informed performance of a Shakespeare play would include original pronunciation. The director could require the actors to perform the familiar looking original text using sounds unfamiliar to them. The director could also provide a transcription of the text in an unfamiliar appearance which contains the current phonetic equivalent of Shakespeare's aural intent. The availability of both the original and transposed texts places the choice of route in the hands of each performer, while the audience is cognizant of only the final product. Detractors to the ideology of semitone re-notation and/or transposing trombone parts might consider these words from Praetorius:

There are many matters of this kind where the impression can be given that there is only one right way of doing something. So, for instance, some keyboard players are held in contempt for not using some particular fingering or other. This is ridiculous, in my opinion. If a player can fly up and down the keyboard, using the tips, mid-joints, or the backs of his fingers—yes, using his very nose if that helps!—and either keeps or breaks every rule in existence, so what? If he plays well, and plays musically, it matters little by what means he does so.⁸¹

Historical Value

Although the body of extant Baroque solo and homogeneous ensemble trombone repertoire is comparatively small, it provides invaluable insight into an instrument family that was once one of the most highly considered, utilized, and remunerated in the Western music world. As the performance practice of lip-reed aerophones was often a highly, and successfully, guarded trade guild secret during the period, the trombonist of

⁸¹ Praetorius–Crookes, 53. Praetorius, *Sm II*, 44/4.

today is primarily limited to information from contemporary and subsequent organology of Baroque instruments and works such as those in this study for guidance. Therefore, it is crucial that the repertoire be available in a scholarly form. Otherwise, the consideration of performance requirements based on deficient editions of the compositions could lead to anachronistic conclusions. The new performance editions resulting from this project are accordingly intended to assist in, rather than hinder, historically informed performance.

Further Research

During the Baroque period, the pairing of trombone(s) with violin(s) was at least as common as pairing trombone(s) with cornett(s). Determination of an historically supported common tuning for violin and trombone repertoire is lacking. The pitch standard for string instruments varied more by period and location than it did for cornetts. Therefore, conclusions would likely be necessary on an original published collection by collection, or venue by venue, basis. The use of *Krum-Bügel* / *Cromette* / *Tortil* [crook] and *Polette* [pipe] trombone attachments, which are mentioned in theoretical treatises, listed in inventories, shown in contemporary images, and accompany some extant instruments, is an avenue for parallel consideration.

During the Renaissance period, the trombone frequented the role of contratenor voice in the *alta* (*i.e.* loud) shawm band as is evidenced in contemporary images and records. Indication of intended forces for instrumental music was exceptionally rare at this time. A comprehensive discussion of realization of the surviving monophonic tenor repertoire and its implications for the nominal pitch of, and its execution on, the trombone of this mixed consort is wanting.

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APPENDIX A
REPERTOIRE

The following compositions were identified as meeting the limitations of this study. From this list, repertoire was selected for the recital component of the project.

Format: Composer (born-died)
 Title (Place of publication, year)
 Instrumentation – {*Tonal center*}

Anonymous (mid- to late-1500s)

63. *Cum esset desponsata* (MS, 1579)

6 trombones – {*F*}

Anonymous (mid- to late-1600s)

Sonata Trombono Solo & Basso (MS, ca. 1665)

1 alto trombone + *Basso continuo* – {*D*}

Braun, Johann Georg Franz (before 1630-after 1675)

XIV. *Canzonato è 4 Tromboni* (Innsbruck, 1658)

4 trombones + *Violone (Basso continuo)* – {*D*}

Cesare, Giovanni Martino (ca. 1590-1667)

“*La Bavara*” (Monaco, 1621)

4 trombones + *Basso continuo* – {*G*}

“*La Hieronyma*” (Monaco, 1621)

1 trombone + *Basso continuo* – {*A*}

Hake, Hans (1628-after 1667)

XXXXI. *Pavan* (Stade, 1654)

5 trombones + *Basso continuo* – {*A*}

XXXXII. *Pavan* (Stade, 1654)

5 trombones + *Basso continuo* – {*G*}

Hentzschel, Johann (fl. 1649)

Canzon, Mitt 8 Viol-Digamben oder Posaunen (Torun, 1649)

8 trombones + *Basso continuo* – {*D*}

Kindermann, Johann Erasmus (1616-1655)

X. *Symphonia* (Nürnberg, 1643)

2 trombones + bass trombone (*Basso continuo*) – {*E*}

XXXIII. *Symphonia* (Nürnberg, 1643)

2 alto trombones + *Basso continuo* – {*D*}

Marini, Biagio (ca. 1597-1663)

Canzon Terza à 4 Tromboni (Venice, 1629)

4 trombones + *Basso continuo* – {D}

Sonata Octava per doi Fagotti ò Tromboni Grossi (Venice, 1629)

2 bass trombones + *Basso continuo* – {E}

Massaino, Tiburtio (ca. 1550-ca. 1609)

Canzon Trigesimaterza, per otto Tromboni (Venice, 1608)

8 trombones + *Basso continuo* – {G}

Moritz, Landgraf von Hessen (1572-1632)

Pavana del Tomaso di Canora, à 5 Tromboni (MS, after 1615)

5 trombones – {D}

Rognoni (Taeggio), Francesco (15??-after 1625)

Modo di passeggiar per il Violone ouer Trombone alla Bastarda / ‘Susana D’orlando’ (Milano, 1620)

1 bass trombone – {G}

Speer, Daniel (1636-1707)

Sonata [1] (Ulm, 1697)

2 trombones + bass trombone (*Basso continuo*) – {A}

Sonata [2] (Ulm, 1697)

2 trombones + bass trombone (*Basso continuo*) – {E}

‘Rilpe, Asne de’ [anagram pseudonym of Daniel Speer (1636-1707)]

Sonata à 4 (Frankfurt, 1685)

4 trombones + *Basso continuo* – {D}

Utrecht, Heinrich (1???-1633)

XVII. *Paduana à 5 Voci, Tromboni vel Fagotti* (Wolfenbüttel, 1624)

5 trombones + *Bassus generalis* – {D}

XVIII. *Paduana à 5 Voci, Tromboni vel Fagotti* (Wolfenbüttel, 1624)

5 trombones + *Bassus generalis* – {A}

Four additional early homogeneous trombone ensemble collections are known.⁸² Both of the Scheidt collections listed below are incomplete and therefore not usable for performance or concrete analysis. While the determination of his chosen keys may be possible from examination of the surviving part books, they were not readily accessible in any form. The Cruse and Geisler collections, both originating from the Moravian church, are scored to include the otherwise seldom-indicated descant [soprano] trombone. While their keys⁸³ generally support the conclusions of this study, they were not included due to the special nature of their instrumentation and the approximate dates of their origin placing them within the Classical period.

Scheidt, Samuel (1587-1654)

Ludorum musicorum secunda pars (Hamburg, 1622)

[contains 15 four-part pieces; foreword states that they can be played on trombones; only two of its five part books have survived.]

Scheidt, Samuel (1587-1654)

Ludorum musicorum quarta pars (Hamburg, 1627)

[contains a canzon (No. 18) indicated for 4 trombones; incomplete.]

Cruse, [?G.D. or ?Elias Fürchtegott] (fl. ca. 1780)

six manuscript sonatas (Salem, North Carolina: Moravian Music Foundation)

4 trombones – {*D*, *G* ×4, *F*}

Geisler, Christian Gottfried (1730-1810)

Sonata I-XXIII (Zeist, Netherlands: Moravian Congregation part books, Z1157)

4 trombones – {*E-flat*, *D* ×7, *C* ×5, *B-flat*, *A* ×2, *G* ×5, *F*, ?}

⁸² Thanks go to Howard T. Weiner for generously sharing his knowledge of repertoire, the location of holdings, and access to facsimiles.

⁸³ Carter, “Trombone Pitch...,” 56.

APPENDIX B
FACSIMILE, *URTEXT*, AND CRITICAL EDITIONS

For the primary source of each composition identified for inclusion in this study (Appendix A), preference was given in the following order: 1) published facsimile; 2) microfilm / microform facsimile; 3) critical edition; 4) *urtext* edition.

Anonymous. “63. *Cum esset desponsata*.” In *1579 Orlandi Lassi sexta vocum*. Regensburg, Germany: Bischöfliche Zentralbibliothek manuscript A.R. 775-777, 1579. Facsimile.⁸⁴

Anonymous. “*Sonata Trombono Solo & Basso*.” In *Scala Musices*. Brno, Czech Republic: Moravian Museum manuscript D189, ca. 1665. Facsimile.⁸⁵

Braun, Johann Georg Franz. “*Canzonato è 4 Tromboni*.” In *Odae Sacrae I, II, Vocibus & I, II, Violinis, Accommodatae et Compositae à Joanne Georgio Francisco Braun ... Opus primum*. Innsbruck, [Austria]: Michaelis Wagneri, 1608. Microfilm.

Cesare, Giovanni Martino. “*La Bavara*.” In *Musicali melodie, per voci et instrumenti à una, due, tre, quattro, cinque, e sei*. Monaco: Nicolao Hanrico, 1621. Microfilm.

_____. “*La Hieronyma*.” In *Musicali melodie, per voci et instrumenti à una, due, tre, quattro, cinque, e sei*. Monaco: Nicolao Hanrico, 1621. Microfilm.

Hake, Hans. “XXXXXI. *Pavan a 5*.” In *Ander Theil newer Pavanen, Sonaten, Arien, Balletten, Brandlen, Couranten, und Sarabanden, mit 2. 3. 4. 5. und 8. Instrumenten mit dem Basso Continuo*. Stade, [Germany]: Elias Holwein, 1654. Microfilm.

_____. “XXXXXII. *Pavan a 5*.” In *Ander Theil newer Pavanen, Sonaten, Arien, Balletten, Brandlen, Couranten, und Sarabanden, mit 2. 3. 4. 5. und 8. Instrumenten mit dem Basso Continuo*. Stade, [Germany]: Elias Holwein, 1654. Microfilm.

Hentzschel, Johann. *Canzon*. Edited by Ruedy Ebner. Basel, Switzerland: Musik-Akademie, [1979]. Facsimile.

Kindermann, Johann Erasmus. “X. *Symphonia*.” In *Deliciae studiosorum*, edited by Alessandro Bares, 8. Stuttgart, [Germany]: Musedita / Cornetto-Verlag, 2003. *Urtext*.

⁸⁴ Thanks go to Eric F. Fiedler for generously providing these personal digital photographs.

⁸⁵ Thanks go to Irvin L. Wagner for generously providing this personal photocopy.

Kindermann, Johann Erasmus. "XXXIII. *Symphonia*." In *Deliciae studiosorum*, edited by Alessandro Bares, 24. Stuttgart, [Germany]: Musedita / Cornetto-Verlag, 2003. *Urtext*.

Marini, Biagio. "*Canzon terza à 4 Tromboni*." In *Sonate, symphonie, canzoni, passemmezzi, baletti, corenti, gagliarde e retornelli*, edited by Hugh Ward-Perkins. Firenze, [Italy]: Studio per Edizioni Scelte, 2004. Facsimile.

_____. "*Sonata Octava per doi Fagotti ò Tromboni Grossi*." In *Sonate, symphonie, canzoni, passemmezzi, baletti, corenti, gagliarde e retornelli*, edited by Hugh Ward-Perkins. Firenze, [Italy]: Studio per Edizioni Scelte, 2004. Facsimile.

Massaino, Tiburtio. "*Canzon Trigesimaterza, per otto Tromboni*." In *Canzoni per sonare con ogni sorte di stromenti, a Quattro, Cinque, & Otto, con il suo Basso generale per l'Organo, ... Libro primo*. Venetia, [Italy]: Alessandro Raverio, 1608. Microfilm.

Moritz (Landgraf von Hessen). "*Pavana del Tomaso di Canora, à 5 Tromboni*." In *Das Erbe Deutscher Musik, Zweite Reihe, Landschaftsdenkmale der Musik, Kurhessen, Band 1*, edited by Werner Dane, 5. Kassel, [Germany]: Bärenreiter, 1936. *Urtext*.

Rognoni Taeggio, Francesco. "*Modo di passeggiar per il Violone Ouer Trombone alla Bastarda*." In *Selva de varii passaggi*, edited by Arnaldo Forni. [Bologna, Italy]: Bibliotheca musica Bononiensis, 1970. Facsimile.

Speer, Daniel. "*Sonata*." In *Grundrichtiger Unterricht der musikalischen Kunst, oder Vierfaches musikalisches Kleeblatt*, edited by Isolde Ahlgrimm, 225-227. Leipzig, [Germany]: Edition Peters, 1974. Facsimile.

_____. "*Sonata*." In *Grundrichtiger Unterricht der musikalischen Kunst, oder Vierfaches musikalisches Kleeblatt*, edited by Isolde Ahlgrimm, 228-231. Leipzig, [Germany]: Edition Peters, 1974. Facsimile.

_____. "*Sonata für vier Posaunen und Generalbaß*." In *Das Erbe deutscher Musik. Band 14, Kammermusik, Band 2, Deutsche Bläsermusik vom Barock bis zur Klassik*, edited by Helmut Schultz, 26-28. Kassel, [Germany]: Nagels Verlag, 1961. *Urtext*.

Utrecht, Heinrich. "XVII. *Paduana 5 Voc*." In *Parnassi musici Terpsichore : Hoc est Paduana, Galliarda, Alemanda, Intrada, Mascharada, Aria, Couranta, Volta, Quinq[ue]; Vocum, cum Basso generali in usum & gratiam Musicorum emissa*. Gvelfherbyti [Wolfenbüttel, Germany]: Elias Holwein, 1624. Microfilm.

Utrecht, Heinrich. "XVIII. *Paduana 5 Voc.*" In *Parnassi musici Terpsichore : Hoc est Paduana, Galliarda, Alemanda, Intrada, Mascharada, Aria, Couranta, Volta, Quinq[ue]; Vocum, cum Basso generali in usum & gratiam Musicorum emissa*. Gvelfherbyti [Wolfenbüttel, Germany]: Elias Holwein, 1624. Microfilm.

APPENDIX C
SUBSEQUENT PERFORMANCE EDITIONS

The following performance editions retain the nominal pitches of their respective original compositions. Performances from these publications, as well as those listed in Appendix B, have three tonal options: 1) perform one semitone below [A^{+0}] the composer's original intent; 2) transpose the work up one semitone [A^{+1}]; or c) approach both current and period trombones as being based on $A_4=466\text{Hz}$. The third option results in the E-flat alto, B-flat tenor, F bass, and E-flat bass trombones respectively having a first position overtone series on *D, A, E*, and *D*. For each work listed, the composer's name has been reproduced exactly as it appears on the publication, including abbreviations and errors. No edition of any composition included in this study was located which provided either a semitone higher ($A_4=440\text{Hz}$) re-notation or transposing parts for alto and bass trombones.

Anonymous. "St. Thomas Sonata." Edited by Ken Shifrin. Birmingham, England: Virgo Music Publishers, 1999.

Anonymous. *Sonata for Trombone Solo and Basso*. Edited by Irvin L. Wagner. McPherson, Kansas: Frederick Music Publications, 1978.

Anonymous. *Sonata Trombono & Basso*. Edited by Howard Weiner. Ithaca, New York: Ensemble Publications, 2002.

Braun, J. G. F. *Canzonato*. Edited by Konrad Ruhland. München, [Germany]: Musikverlag Max Hieber, 1979.

Cesare, G. M. "La Hieronyma." In *The Baroque Trombone*, edited by Simon Wills, 11-14. London, [England]: Faber Music Ltd., 1997.

Cesare, G. M. *Canzon "La Hieronyma."* Edited by Klemens Schnorr. Zumikon, [Switzerland]: Editions Marc Reift, 1989.

Cesare, Gio. Martino. *La Bavara*. Edited by Glenn Smith. [Nashville, Tennessee]: The Brass Press, 1977.

Cesare, Gio. Martino. *La Bavara*. Edited by Konrad Ruhland. München, [Germany]: Musikverlag Max Hieber, 1980.

- Cesare, Gio. Martino. *La Hieronyma*. Edited by Konrad Ruhland. München, [Germany]: Musikverlag Max Hieber, 1977.
- Cesare, Giovanni M. *La Bavara*. Edited by William Runyan. Monteux, France: Musica Rara, 1981.
- Cesare, Giovanni Martino. “*La Bavara a 4.*” In *Musicali melodie*, edited by Robert Ischer, 34-38. Bologna, [Italy]: Ut Orpheus Edizioni, 1998. *Urtext*.
- Cesare, Giovanni Martino. “*La Hieronyma a 1.*” In *Musicali melodie*, edited by Robert Ischer, 6-7. Bologna, [Italy]: Ut Orpheus Edizioni, 1998. *Urtext*.
- Cesare, Giovanni Martino. “*La Hieronyma.*” In *Sackbut Solutions*, edited by Adam Woolf, 136-137. Mechelen, [Belgium]: Adam Woolf, 2009.
- Cesare, Giovanni Martino. *La Hieronyma*. Edited by Glenn P. Smith. Paris, [France]: Editions Musicales Alphonse Leduc, 1972.
- Hake, Hans. “*Pavan XXXXI.*” In *Heft 6: 2 Pavanen*, edited by Ingeborg Opitz. [Stuttgart, Germany]: Cornetto-Verlag, 2009.
- Hake, Hans. “*Pavan XXXXII.*” In *Heft 6: 2 Pavanen*, edited by Ingeborg Opitz. [Stuttgart, Germany]: Cornetto-Verlag, 2009.
- Henschel [sic], Johann. *Canzona a 8*. Edited by Don Sweete. [Markham, Ontario]: Eighth Note Publications, 1997.
- Hentzschel, Johann. *Canzon*. Edited by G. Groothuis. [Tilburg, Netherlands]: G. Groothuis, 1989.
- Hentzschel, Johann. *Canzon*. Edited by Karsten Parow. Gornheim, [Germany]: Parow’schen Musikalien, 1992.
- Hentzschel, Johann. *Canzon*. Edited by Patrice Connelly. Artarman, New South Wales: Saraband Music, 2001.
- Kindermann, Johann Erasmus. “[?title].” In *Symphonia und Aria*, edited by Hans Skarba, [?pages]. Kenzingen, Germany: Edition H.S., 1999.
- Kindermann, Johann Erasmus. “*Symphonia I.*” In *Drei Symphonien und eine Sonate*, edited by Uwe Wolf, 4-5. Berlin, [Germany]: Edition Merseburger, 1988.
- Kindermann, Johann Erasmus. “*Symphonia II.*” In *Drei Symphonien und eine Sonate*, edited by Uwe Wolf, 10-12. Berlin, [Germany]: Edition Merseburger, 1988.

- Marini, Biagio. "*Canzon III a Quattro Tromboni o Viole.*" In *Sonate, Sinfonie, Canzoni, Passemmezzi, Balletti, Correnti, Gagliarde, & Ritornelli*, edited by Maura Zoni, 116-120. Milano, [Italy]: Edizioni Suvini Zerboni, 2004. Critical edition.
- Marini, Biagio. "*Sonata Octava.*" In *Zwei Sonaten (Nr. 8 und 9)*, edited by Martin Lubenow, 1-3. Gernersheim, [Germany]: Verlag Martin Lubenow, 1994.
- Marini, Biagio. "*Sonata VIII per due Fagotti o Tromboni Grossi.*" In *Sonate, Sinfonie, Canzoni, Passemmezzi, Balletti, Correnti, Gagliarde, & Ritornelli*, edited by Maura Zoni, 30-31. Milano, [Italy]: Edizioni Suvini Zerboni, 2004. Critical edition.
- Marini, Biagio. *Canzon Terza*. Edited by Irmtraut Freiberg. Crans-Montana, Switzerland: Editions Marc Reift, [?2006].
- Marini, Biagio. *Canzon terza*. Edited by Martin Lubenow. Gernersheim, [Germany]: Verlag Martin Lubenow, 1994.
- Marini, Biagio. *Canzon*. Edited by Howard Weiner. Ithaca, New York: Ensemble Publications, 2005.
- Marini, Biagio. *Canzona*. Edited by Glenn Smith. Buffalo, New York: Ensemble Publications, 1965.
- Massaino, T. "*Canzon per Otto Tromboni Nr. 33.*" In *Die Instrumentalmusik Giovanni Gabrielis*, edited by Stefan Kunze, 65-69. Vol. 8 of *Münchener Veröffentlichungen zur Musikgeschichte*. Tutzing, [Germany]: Hans Schneider, 1963.
- Massaino, Tiburtio. "*33. Canzon Trigesimaterza a 8 Per otto Tromboni.*" In *Alessandro Rauerij's Collection of 'Canzoni per sonare' (Venice, 1608)*, Vol. 2, edited by Leland Earl Bartholomew, 141-146. PhD thesis, University of Michigan, 1962.
- Massaino, Tiburtio. "*Canzon Trigesimaterza, per otto Tromboni.*" In *Denkmäler der Tonkunst in Österreich, Band 110*, edited by Raffaello Monterosso, 58-63. Graz, [Austria]: Akademische Druck- und Verlagsanstalt, 1965.
- Massaino, Tiburtio. *Canzon 33 a 8*. Edited by Irmtraut Freiberg. Crans-Montana, Switzerland: Editions Marc Reift, [?2006].
- Massaino, Tiburtio. *Canzon per 8 Tromboni*. Edited by Robert King. North Easton, Massachusetts: Robert King Music Co., 1964.
- Massaino, Tiburtio. *Canzon*. Edited by Edward Solomon. Coventry, England: Warwick Music Ltd., 2003.

- Massaino, Tiburtio. *Canzona for Eight Trombones*. Edited by Cutler Silliman. Buffalo, New York: Ensemble Publications, 1964.
- Massaino, Tiburto [sic]. *Canzon 33*. Edited by Alan Lumsden. London, [England]: Musica Rara, 1969.
- Moritz Landgraf of Hessen. "[?title]." In *Pavanen und Intradan*, Vol. 4, Book 3, edited by Paul-Heinz Leifhelm. Stuttgart, [Germany]: Cornetto-Verlag, 2009.
- Moritz Landgraf of Hessen. "*Pavana del Tomaso di Canoro a 5 tromboni*." In *The Kassel Pavan Collection*, Vol. 1: Nos. 1-43, edited by Bernard Thomas. [Brighton, England]: London Pro Musica Edition, 1994.
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- Speer, Daniel. "Sonata 1." In *Sackbut Solutions*, edited by Adam Woolf, 184-185. Mechelen, [Belgium]: Adam Woolf, 2009.
- Speer, Daniel. *2 Sonatas*. Edited by Andreas Mössinger. Würzburg, [Germany]: Edition Crescendo, [year?].
- Speer, Daniel. *Sonata à 4*. Edited by Howard Weiner. Ithaca, New York: Ensemble Publications, 2005.
- Speer, Daniel. *Sonata für 4 Posaunen*. Edited by Bernd Limberg. [Hünstetten-Limbach, Germany]: G & C Notenverlag, [2000].

Speer, Daniel. *Sonata, 3 Trombones*. Edited by Scott Richards. Crans-Montana, Switzerland: Editions Marc Reift, 1997.

Speer, Daniel. *Sonata, 4 Trombones*. Edited by Scott Richards. Crans-Montana, Switzerland: Editions Marc Reift, 1997.

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APPENDIX D

PERMISSION TO REPRINT BY DR. BRUCE HAYNES

From: Bruce Haynes <bruce.haynes@mcgill.ca>
Date: May 18, 2010 17:10:10 EDT
To: "Paul W. Palm" <pwpalm@uncg.edu>
Subject: Re: reprint permission request

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18 May, 2010

To Whom it May Concern,

I hereby grant permission to Paul W. Palm to reproduce Graphs 1, 4, and 20 from my book, A history of performing pitch: the story of "A" (Lanham, 2002) in his dissertation.

Sincerely,

Bruce Haynes
Schulich School of Music, McGill University